In The Name of God

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Optimization of Electrospinning Parameters for PAN and PAN-MgO Nanofibers in Air Filtration Applications

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Abstract:

The present study aimed to optimize the some electrospinning parameters for PAN nanofibers and PAN nanofibers containing MgO nanoparticle for achieving adequate fiber diameter and mat porosity for application in air filtration. Optimization of electrospinning parameters (applied voltage, solution concentration, and spinning distance) was conducted through the Response Surface Methodology. In total 30 trials were done according to the prepared study design. The fiber diameter and porosity measurement was done using SEM image analysis. For air filtration testing, the nanofiber mat was produced based on the suggested optimum conditions for the variables of electrospinning to produce nanofiber of desirable fiber diameter and porosity range. According to results, lower solution concentration favors thinner fiber and MgO nanoparticle -embedded PAN solutions gave smaller diameter fibers. Regression analysis emphasized that solution concentration is the major significant factor that affects the average nanofiber diameters and porosity. Porosity of PAN media is inversely related to fiber diameter, although the larger diameter of PAN-MgO gives the higher porosity. At a given spinning distance, there was a positive curvilinear relationship PAN-fiber diameter and applied voltage; and also a negative correlation between PAN-MgO fiber diameter and applied voltage. The porosity of PAN electrospun mat increases with decreasing the solution concentration and at any given concentration, porosity was increased with increase in applied voltage and spinning distance. The lower concentration of PAN-MgO gave lower porosity and there were curvilinear relationships between porosity and both spinning distance and applied voltage at any concentration. According our optimization results, we could develop filter media which can be comparable to HEPA filter regarding collection efficiency and pressure drop. Through these empirical models, we hope to provide an orientation to the subsequent experiments to form uniform and continuous nanofibers for future applications in air purification.

Keywords: Electrospinning, Filtration, Polyacrylonitrile Nanofiber, Magnesium oxide nanoparticle, Response Surface Methodology.

Mass transport of inhaled nanoparticles from human lung to whole body

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Abstract:

Inhaled nanoparticles can have both toxic and therapeutic effects for human. CNTs, asbestos fibers and other industrial nanomaterials could cause pulmonary diseases. On the other hand inhaled nanomedicines have been developed for treating pulmonary or systemic diseases. Thus, many researches in the area of inhaled nanoparticle retention and clearance has been developed. In this research a multi compartmental model has been developed that can predict the bio-kinetics of insoluble nanoparticles translocation from lungs to systematic circulation, lymphatic systems, gastrointestinal tract and organs. In order to calculate the amount of nanoparticles in each compartment, a system of differential equations quantifying the transport of particles from one compartment to another were solved. Experimental retention of nanoparticles in rat lung was used to find transport rates in the model equations. The model transport rates were found by minimizing the mean square error existed between the model and experimental retention data. Calculated transport rate for the rat has been converted to the human onesusing a valid allometric scaling method. This model provides a complete specification of the residence time in lungs, blood circulation and other key organs of the body and can be used in diverse fields such as toxicology for exposure-risk analysis and respiratory nano-drug development and targeting.

Nanoparticle deposition in mouth, trachea, bronchia and alveoli during inhalation was obtained by the program multiple-path particle dosimetry (MPPD) and was used as initial condition of the corresponding equation. Kolanjiyil and Kliensteruer (2013) showed that only 0.2% of the nanoparticles were translocated to the olfactory region within 800 days. So, we don't have to consider the olfactory compartment in the model. Our results showed that significant amount of nanoparticles could reach heart and liver, which has nonreversible side effects.

Keywords: Multi compartment modeling, nanoparticle deposition

Novel paint design based on nanopowder to protection against X and Gamma rays.

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Abstract:

Lead-based shields are the standard method of intraoperative radiation protection in the radiology and nuclear medicine department. Human lead toxicity is well documented. The lead used is heavy, lacks durability, is difficult to launder, and its disposal is associated with environmental hazards. The aim of this study was to design a lead free paint for protection against X and Gamma rays. In this pilot st we evaluated several types of nano metal powder that seemed to have good absorption. The Monte Carlo code, MCNP4C, was used to model the attenuation of X-ray photons in paints with different designs. Experimental measurements were carried out to assess the attenuation properties of each paint design. Among the different nano metal powder, nano tungsten trioxide and nano tin dioxide were the two most appropriate candidates for making paint in diagnostic photon energy range. Nano tungsten trioxide (15%) and nano tin dioxide (85%) provided the best protection in both simulation and experiments. After this step, attempts were made to produce appropriate nano tungsten trioxide-nano tin dioxide paints. The density of this nano tungsten trioxide-nano tin dioxide paint was 4.2 g/cm(3). The MCNP simulation and experimental measurements for HVL (Half-Value Layer) values of this shield at 100 kVp were 0.25 and 0.23 mm, respectively. The results showed the cost-effective lead-free paint can be a great power in absorbing the X-rays and Gamma rays and it can be used instead of lead.

Keywords: Lead-free shields, Nano metal powder, Radiation protection

Cell cytotoxicity of active targeted mAb coupled loaded nanocarrier

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Abstract:

Methotrexate (MTX) is a folate antimetabolite that competitively binds to dihydrofolatereductase (DHFR). MTX widely used in the treatments of various types of malignancies, but high toxicity and short plasma half-life have limited its use. Targeted drug delivery is a method of delivering medication to a patient in a manner that increases the concentration of the drug in infective organs or cells, relative to others. Monoclonal antibodies (mAb) conjugation to drug carriers is a potent method in targeted drug delivery. In this work the mAb-decorated biodegradable poly (lactide-co-glycolide) (PLGA) nanoparticles were developed for tumor targeting.

Drug loaded PLGA nanoparticles (NPs) were prepared by solvent dispersion/evaporation method, with the PVA as a surfactant. Then mAb attached to particles with the aim of carbidiimides as a linker. The amount of antibody coupled investigated by the bradford method. The size and feature of obtained nanoparticles confirmed by photon correlation spectroscopy, transmission electron microscopy and fourier transform infrared spectroscopy. In vitro cytotoxicity of particles investigated on cancerous cell lines.

The encapsulation efficiency of the prepared PLGA-mAb nanoparticles was found to be 65%. PCS investigation showed that the average size of approximately 160±10 nm and 200 nm for PLGA and PLGA-mAb NPs respectively, and the PDI of particles lower than 0.3 that proved with TEM micrographs. Characterization of the products by FT-IR and Bradford method proved that PLGA-mAb nanoparticles were obtained. In vitro release profile indicated that nearly of 90% of the drug was released in the first 24 hrs for both PLGA and PLGA-mAb NPs. The in vitro cytotoxicity of the nanoparticles on cancerous cell lines showed that the PLGA-mAb nanoparticles are more cytotoxicity compared to non-mAb-mediated carriers.

Keywords: Targeted drug delivery, Monoclonal antibodies, In vitro cytotoxicity

Fluorescence spectroscopic investigation of the interaction between lactate dehydrogenase and nanoparticle silver

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Abstract:

Nanosilver products which have well-known antimicrobial properties have been used extensively in a range of medical settings. Despite the widespread use of nanosilver products, relatively few studies have been undertaken to determine the biological effects of nanosilver exposure. The present study was designed to evaluate size -dependent protein interaction of known biologically active silver nanoparticles (Three different size)was studied by various kind of spectroscopic. In order to study the mechanisms underlying the effects of silver nanoparticules on lactate dehydrogenase (LDH,EC1.1.1.27)we were injected with nanosilver of various doses into solution LDH. We then examined LDH activity and direct evident for interaction between nanosilver and LDH using spectral methods.

LDH;By fluorescence spectral assays, the nanoparticulate silver was determined to be directly bound to LDH ,and nanoparticulate silver induced the protein unfolding. It was concluded that the binding of nanoparticulate silver altered LDH structure and fuction. The fluorescence data showed that the binding of nanosilver to proteins caused strong static fluorescence quenching. The binding constants of nanosilver to LDH were determined in presence of three different sizes of nanosilver particles under the physiological condition. The titration results indicated that nanosilver quenched the fluorescence intensity of LDH through static mechanism, and There are three different kinds of interaction behaviour with three different size, the results showed that the fluorescence quenching of LDH originated from the Trp and Tyr residues, and indicated a conformational change of LDH with the addition of the nanosilver. The three-dimentional fluorescence spectroscopy and resonance light scattering method data confirm these results. This study showed that the size and concentration of nanoparticles are important in their effect on biomolecules, so it is useful to study on toxicity of silver nanoparticles invivo.

Keywords: Lactatedehydrogenase , Nanosilverparticles , fluorescence spectroscopy

Mesoporous silica hollow sphere enhance the cytotoxicity of anticancer palladium complexes

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Abstract:

In this study, mesoporous silica hollow spheres (MSHS) were synthesized and characterized by XRD, N2 adsorption-desorption, scanning electron microscopy (SEM), and FT-IR. Next, two new palladium(II) complexes containing 2-(Furan-2-yl)-1H-Imidazo[4,5-f][1,10] Phenanthroline (FIP) and 2-(thiophen-2-yl)-1H-imidazo[4,5-f][1,10] phenanthroline (TIP) ligands have been synthesized and the structures of the compounds, [Pd(Phen)(TIP)](NO3)2 and [Pd(Phen)(FIP)](NO3)2 were determined by applying 1H-NMR, UV-visible and FT-IR spectroscopic methods and elemental analysis. Also, the interaction of human serum albumin (HSA) with two synthesized palladium(II) complexes were investigated using isothermal titration UV-visible spectrophotometry in 10 mmol/L Tris buffer, pH 7.4. Then, palladium drugs loaded into MSHS by wet impregnation method and release profile of palladium drugs from the MSHS in acetate buffer solution (pH 4.5) and phosphate buffer solution (pH 7.4) were evaluated by dialysis method. This cytotoxicity of the drug-loaded MSHS was even higher than of the pure drugs in solutions, suggesting that MSHS loaded with palladium drugs enabled a localized intracellular release of the palladium compounds and possibly also facilitated the drug's hydrolysis, enhancing the desired cytotoxic effect.

Keywords: Mesoporous silica hollow sphere, Palladium complexes, Cytotoxic

Antibacterial effects of Ag/ZnO nanoparticle on renal damage in rat model of pyelonephritis

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Abstract:

Objective: Urinary tract infection has change a basic challenge in human population. Antibacterial nanoparticles have turned over the new leaf in scientist's research. Materials and Methods: Ag/ZnO nanoparticle is synthesis in high temperature (5000C). FT-IR, XRD, SEM and TEM were used for determination of spectroscopic, structural and morphology of samples, respectively. Also the nanoparticle was digested and analyzed by ICP-AES for determining the presence of residual chemical element in the nanoparticle. Bacterial sensitivity to nanoparticle was commonly tested using by MIC and MBC tests. For achievement of in vivo tests, the renal of rats were injected and then were infected with E.coli. After that, animals were divided to 9 treatment group and the effect of three concentrations of MIC and MBC; also intermediate concentrations of MIC and MBC and each as a separate group, were studied. Results: The particles size was less of 12 nm, approximately. The MIC and MBC observed for Ag/ZnO were 32µgml-1 and 512µgml-1 for E.coli, respectively. Treatment with a concentration 512 µgml-1 of Ag/ZnO nanoparticle in combination with Ciprofloxacin reduced severity of renal cortical thickness of pyelonephritis rats. The microscopic pathological examination indicated that there was no any severe Inflammation of renal tubules in the groups that had been treated with 512 µgml-1 concentration of Ag/ZnO nanoparticle in combination with ciprofloxacin. In compared with the control groups. Conclusions: This study showed that the Ag/ZnO nanoparticle in cooperation with ciprofloxacin has great antimicrobial effect against E.coli on renal damage of Pyelonephritis.

Keywords: Antibacterial, Ag/ZnO Nanoparticle, Pyelonephritis

Enhancement of new ZnO nanofluid formulations against various bacteria and fungi

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Abstract:

ZnO NPs and their water- based nanofluids containing new formulations have used in this study. Because they are most significant metal oxide nanoparticles, in industrial scale and available in many countries with various applications such as pharmaceutical. ZnO NPs are nontoxic, permeable and new formulations including modified high surface energy with (PEG, amine, polymer, solvent, and surfactant) are able to dissolve in water. Due to these observations, 12 different and novel zinc oxide nanofluids were fabricated by sol-gel method, and used as new formulation with functionalized surface and were applied against some gram positive and negative bacteria and fungi. The characterization was determined by XRD, FTIR, DLS, zeta-potential, SEM technique and UV-Vis absorbance spectroscopy. Also antimicrobial activity based on minimum inhibitory concentration and agar well method with standard strains of bacteria and fungi were performed. Among the13 different bacteria strains, new ZnO nanofluids, nanocomposites and ZnO/ polymer products were showed the best effect on gram positive bacteria like: Enterococcus faecalis, Strep A pyogenes and Staphylococcus aureus and listeria monocytogenes and gram negative (Escherichia coli) had un growth zones 60mm, 60 mm, 35 mm, 40 mm and 25 mm in comparing with gentamycin 20mm, 25mm, 30 mm, 25mm and 10 mm. So the MIC of ZnOnanoformulations on bacteria were determined as 0.75, 0.75, 6.25, 3.12, and 12.5mg/ml respectively. Additionally our examination showed noticeable results for dermatophyte fungi like T.mentagrophytes and M.canis which had un growth zones 70 and 35 in comparing with Clotrimazole 30mm and 25 mm and MIC ZnO NPs on fungi were determined to be equal to 0.35 and 6.25 mg/ml. These findings represented that ZnO nano fluids can generate the most influence on some gram positive bacteria and fungi in nano medicine science which cause dermal and mucosal infections, fetal abortion ,water pollution, anthrax, bed sore and burn infection

Keywords: ZnO nanofluids, Antimicrobialactivity, Medicine

Preparation and investigation of antibacterial activity of Fe_3O_4 LDH EDTA-Ag

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Abstract:

Magnetic nanoparticle Fe3O4 was covered in aluminum _ nickel Layered Double Hydroxide (LDH) by sol-gel process. Subsequently, the EDTA-dianhydride attached to the hydroxide surface of magnetic nanoparticles (MNP) during the nucleophilic attack. Then, the Ag nanoparticles embedded in this polycarboxylic layer by chelating mechanism. The Fe3O4 LDH EDTA-Ag were characterized by scanning electron microscopy, atomic force microscopy and Fourier–transform infrared spectroscopy. The antibacterial effect of the synthesized silver nanocomposite was studied by disk diffusion, minimum inhibition (MIC) and minimum bactericidal concentrations (MBC) methods against some bacterial strains. Finally, the new nanocomposite displayed potent antimicrobial activity against Gram–negative and Gram–positive bacteria. These properties indicated that the films could be potentially useful as antimicrobial materials in a wide variety of waste water treatment, biomedical and general use applications.

Keywords: Magnetic nanoparticles, Antibacterial activity, Silver

Nanotechnology safety-its importance in engineering education

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Abstract:

Nanotechnology has gained a great deal of public interest due to need and applications of nanomaterials in many area of human endeavors including industry, agriculture, business, medicine and public health. However, the safety of nanomaterials has raised serious concerns since current research indicates that the nanomaterials can interact with human and animal cells or organs and damage or kill those cells or organs, block blood flow and cause serious health harms, due to their physicochemical characteristics such as shape, size, surface area, charge, etc. At such, worker protection should be paramount within any nanomaterial over sight regime. There are a number of protection methods to manufacture non-toxic nanomaterials and nanodevices. The aim of this paper is to present the recent development on those nanomaterials and protection methods. This is necessary to protect university students involved in production and the use of these materials. We consider that our study will improve the quality of students and engineers life by safety using nanomaterials which can benefit society in general.

Keywords: Nanoeducation, Nanomaterials, Protection

The study of antibacterial activities of synthesized Ag nanoparticles using waste extract

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Abstract:

Ag nanoparticle as one of the most used nanoparticles in dealing with infectious diseases has been considered by researchers. Therefore many reports for synthesis of Ag nanoparticles has been presented like chemical reduction using poisonous and dangerous materials like: N2H4, NaBH4 and N,N-Dimethyl Formaldehyde. Metallic nanoparticles are widely used so developing biocompatible methods like synthesis process by biomimetic method is considered. In this project according to the green chemistry's principles, biological reduction by waste extract has been used. The extract of some of Cellulosic wastes was used as reducer and stabilizer. Cellulosic wastes had an important role in reducing metals and synthesis of Nanostructured metals because of cellulose, hemicellulose, pectin and lignin. The easiness, availability of waste, low Cost and non-toxic wastes are the benefits of this method. Scanning Electron Microscopy confirmed the nanoparticles and the EDX spectrum of the Ag nanoparticle solution in the presence of an Ag signal, confirmed an element without Impurity. Absorption spectrum shows the maximum absorption in about 420-430 nanometers. With the comparison between maximum absorption wave lengths of synthesized Ag nanoparticles and other researcher's reports based on maximum absorption wave length and nanoparticle's measure relation can estimate synthesized nanoparticle's measure about 35-50 nanometers. Although UV-vis spectrum shows that with increasing concentration of AgNO3, the maximum absorption has been increased. In other words the concentration of nanoparticles has been increased. In addition the comparison between reducer's effects (pomegranate waste, watermelon peel and Olvera) shows that pomegranate waste is better for reducing. The Scanning Electron Microscopy and UV-vis spectra can estimate the nanoparticle measures less than 40 nanometers. The anti-bacterial activities of Ag nanoparticles investigated against gram-positive Pseudomonas.areuginosa, Staphylococcus and gram-negative E.coli. The results showed that Ag nanoparticles synthesized by this method has a high antibacterial property.

Keywords: Ag nanoparticles, Green chemistry, Cellulosic wastes

Prenatal exposure to silver nano-particles induced depressive and not anxiety-like behaviors in adult male offspring

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Abstract:

Nanosilver has become one of the most widely used nanomaterials in consumer products and its production has been estimated 250–312 tons worldwide. Despite the wide application of nanosilver, there is a serious lack of information concerning their impact on human health. Due to the unique antimicrobial and many other broad spectrum biotechnological advantages, silver nanoparticles (Ag-NPs) are widely used in biomedical and general applications. Very little is known about the toxicity of nano-sized silver particles, however, the size and surface area are recognized as important determinants for toxicity. It is believed that reactive oxygen species (ROS) and oxidative stress results from an increased generation of ROS or from poor antioxidant defense systems may be responsible for the neurotoxicity of Ag-NPs. In this regard, we examined whether maternal exposure to (Ag-NPs) is able to induce depressive-like behaviors in the adult male offspring. Results revealed that daily administration of 15 mg/kg Ag-NPs (average size of 10nm and 30nm, orally) to pregnant female NMRI mice during gestational period produced depressive-like behaviors in adult male offspring when assessed by forced swimming test and splash test. Using open-field and hole-board tests, similar treatments induced no alteration in anxiety-like behaviors of experimental animals. Also, we showed that pretreatment with ascorbic acid (as free radical scavenger) did not reverse the detrimental impact of prenatal exposure to Ag-NPs on animal behavior except for 30 nm Ag-NPs. Furthermore, severity of depressive-like behaviors in animals was dependent on the size of Ag-NPs. The smaller size of Ag-NPs in prenatal state exerted more potent depressant effects in comparison with 30 nm Ag-NPs. Overall, the results of this study suggested that prenatal exposure to Ag-NPs may lead to development of psychiatric disorders such as depression later in life.

Keywords: Silver nanoparticles, Male offspring, Depression

Extraction and determination of brilliant blue food dye in cake and jelly by modified nanosorbent

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Abstract:

A new method has been developed for the separation/preconcentration of trace level brilliant blue food dye using surfactant immobilized on nanosorbent SBA-15 as a new sorbent SPE and their determination by spectrophotometry. Synthesized nanoparticle was characterized by X-ray diffraction (XRD) and transmission electron microscope (TEM). Various influencing parameters on the separation and preconcentration of trace level brilliant blue food dye such as, pH value, amount of nanosorbent, amount of diphenylcarbazone, condition of eluting solution, the effects of matrix ions were examined. The brilliant blue food dye can be eluted from the nanosorbent using CCl4 as a desorption reagent. The detection limit of this method for brilliant blue was 4.9 ngml-1and the R.S.D. was 0.92 % (n=6). The advantages of this new method are including rapidity, easy preparation of sorbents and high concentration factor. The proposed method has been applied to the determination of brilliant blue at trace levels in real samples such as, cake and jelly with satisfactory results.

Keywords: Nanosorbent, Brilliant blue, Cake and Jelly

Antibacterial coatings containing silver nanoparticles generated in situ in a thermal radical initiated system

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Abstract:

Different methods have been followed for the ion reduction, such as photochemical, Electrochemical, chemical reduction. In the present study, thiol-ene that induced by a thermal radical system, has been used to reduce silver ions and prepare a silver/polymer composites based on an in situ bottom-up approach. Thiol-ene radical initiated polymerization proceed by a radical step growth mechanism, which involves two main reactions, the addition of a thiyl radical to the ene double bond followed by a chain-transfer reaction. The use of this radical polymerization system guarantees the preparation of polymers in which the metal nanoparticles synthesized are highly and homogeneously dispersed in the thiol-ene network, showing improved antibacterial properties. Thiol-ene systems, in fact, assure a fast formation of a uniform crosslinked network with high polymerization rates, low shrinkage, and reduced oxygen inhibition. The silver atoms distribution map was investigated by an energy dispersive X-ray analyzer system (EDX). EDX pattern showed a uniform distribution of silver metal in membrane surface owing to cooperation of thiol-ene reaction in the polymerization. This combination presents thiol groups to interact with silver particles and prevent their aggregation lead to proper antiseptic activity of silver. The EDX analysis together with the X-ray fluorescence spectrometer results make possible to confirm the reduction of silver ions to elemental silver particles inside the composite membranes. In addition, morphological analyses were investigated by transmission electron microscope (TEM), in order to conﬁrm the presence of silver nanoparticles and investigate their size. TEM micrographs showed the presence of well dispersed and distributed silver nanoparticles in the polymer network with an average size of the particles being around 30–50 nm. Finally, the antimicrobial activity of was evaluated. A clear antimicrobial action was caused by the silver nanoparticles embedded in the thiol-ene membranes.

Keywords: Silver nanoparticle, Antibacterial, In situ generation

The antioxidant properties of Rosemarinusofficinalis as medical plant by electro-oxidation using single-walled carbon nanotubes

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Abstract:

Antioxidants attract great attention because of their importance for radical scavenging in living organisms. They also have an important role in preventing a variety of diseases and aging because they inhibit or delay the oxidation process by blocking the initiation or propagation of oxidizing chain reactions. Plant tissues contain a network of compounds that control the level of reactive oxygen species, including phenolic compounds, vitamins C and E and several enzymes. Phenolic compounds widely distributed in the natural plants tissues include flavonoids, tannins, hydroxycinnamate esters and lignin. Rosemary (Rosmarinusofficinalis L.) is a spice and medicinal herb widely used around the world. Rosemary has been widely accepted as one of the spices with the highest antioxidant activity. Rosemary essential oil is also used as an antibacterial, antifungal and anticancer agent.

Electrochemical techniques are being developed and improved for determination of antioxidant compounds. These techniques are low-cost and enable rapid analysis of sample. Cyclic voltammetry on carbon nanotube modified electrode appears to be a suitable tool in antioxidant assays.

In this work, leaves of Rosmarinus were dried at shadow and at room temperature. The powdered leaves of the plant were sonicated in methanol for 12 min. It have been compared the voltammograms of methanolic extract of Rosmarinus at a bare glassy carbon and single-walled carbon nanotube (SWCNT) electrodes. The cyclic voltammetric responses for electrochemical oxidation of methanolic extract on the bare and SWCNTs modified electrodes in a 0.25 M buffer solution with a pH of 7.2 recorded. The peak was sharper and the peak current increased significantly on the SWNTs modified electrode as compared with the bare electrode. The electrode surface modification with SWCNTs augmented its effective surface area and the oxidation currents of antioxidants.

Keywords: Medical Plant, Carbon nanotube, Antioxidant

Fe3O4aminopropyltriethoxysilanepolycarboxylic acid polymer Ag: anew generation of antimicrobial agent

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Abstract:

Novel Fe3O4aminopropyltriethoxysilanepolycarboxylic acid polymer Ag nanocomposite were fabricated for the removal of bacteria from waste water by the sol–gel polymerization of aminopropyltriethoxysilane on the Fe3O4 nanoparticles, followed by EDTA-dianhydride attached to the hydroxide surface of magnetic nanoparticles during the nucleophilic attack. Subsequently, Ag nanoparticles embedded in this polycarboxylic layer. Silver nanocomposites were examined by Fourier-transform infrared, scanning electron microscopic images (SEM), X-ray diffraction, and vibrating sample magnetometer (VSM). SEM images showed a layer of silver nanoparticles, polycarboxylic acid polymer and aminopropyltriethoxysilane on Fe3O4. The antibacterial effect was studied by disk diffusion method against some bacterial pathogenic strains. Silver nanoparticles showed promising activity against Staphylococcus aureus and slightly active against Escherichia coli.

Keywords: Fe3O4 nanoparticles, Self-assembled monolayer,Sol-gel

The effect of molar ratio of polyaniline in polyaniline/graphenenanocomposite to investigated the ABTS radical scavenging activity

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Abstract:

Antioxidant activity of polyaniline/graphenenanocomposite (PANI/GR) on graphite pencil in 1M phosphoric acid solution (H3PO4) containing 1 M calcium chloride (CaCl2) is performed. The antioxidant activity is investigated through reaction with 2, 2-azino-bis (3-ethylbenzothiazoline-6-sulfonate) (ABTS) radical in methanol. FT-IR and UV-Visible spectrums demonstrate that there are positive correlations between the molar fraction of polyaniline/graphenenanocomposite and antioxidant activity, the increase in molar ratio of PANI in nanocomposite has increased the antioxidant activity of composite. Furthermore, the electrochemical impedance spectroscopy (EIS) reports that the increase of molar fraction of PANI in nanocomposite has also increased the charge and mass transfer.

Keywords: Electrochemical impedance spectroscopy,ABTS free radicals,Antioxidant activity

Organic supporting electrolyte influence on antioxidant activity of polyaniline/graphenenanocomposite modified electrode synthesized to scavenging DPPH free radical activity

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Abstract:

Polyaniline/graphenenanocomposite modified electrode synthesized on graphite pencil as working electrode in acidic solution and 0.2M PTSA as supporting electrolyte. Polyaniline/graphenenanocomposite antioxidant activity is accomplished through reaction with 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radical cation. The electrochemical impedance spectroscopy (EIS) and UV-Visible spectrums indicate that scavenging of DPPH radicals by Polyaniline/graphenenanocomposite prepared in presence of Para toluene sulfonic acid is efficient to decrease the absorbance of DPPH free radicals thus the antioxidant activity of Polyaniline/graphenenanocomposite is increase in presence of Para toluene sulfonic acid.

Keywords: Polyaniline/graphenenanocomposite, DPPH radicals, Antioxidant activity

Antifungal activity of synthesized silver nanoparticle using cotton seed extract

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Abstract:

Now biological methods used for synthesized silver nanoparticle. The use of plant extracts as biological material, proves it to be suitable for the synthesis of nanoparticles. Plants or their extracts provide a route biological synthesis for the synthesis of metallic nanoparticles environmentally friendly and are possible Synthesis at specified size and shape. Extracellular synthesis of silver nanoparticles using extracts of medicinal plants is done for induction of silver ions in a short time. In this study, flower Stachyslavandulifoli extract was prepared and treated with aqueous solution of silver nitrate. Change color from light yellow to brown in treated extract indicated green synthesis of silver nanoparticles. By absorption UV-visible spectroscopy, Fourier transform infrared spectrometer (FTIR), X-ray diffraction (XRD) and transmission electron microscopy (TEM) Analysis biological synthesis of silver nanoparticles were confirmed. Also the antifungal activity of soluble silver nanoparticles was tested on the most pathogenic fungi.

Keywords: Biosynthesis,Silver nanoparticles,TEM

Physiological and biochemical responses of potato under silver nanoparticle and silver nitrate exposure in invitro conditions

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Abstract:

The aim of this work was to elucidate advantage and disadvantage of supplementation silver nanoparticle (AgNP) and silver nitrate (AgNO3) in invitro culture of potato plant. Our results indicated that 2 mgL-1 of silver (AgNP and AgNO3) treatment resulted in improvement in growth parameters such as fresh and dry weight of shoot. On the other hand, Silver treatments were elevated root length, leaf area and leaf area/shoot length ratio at the 2 mgL-1 concentration. However, shoot length significantly reduced. Total chlorophyll and carotenoids at 2 mgL-1and higher levels increased and reduced, respectively. Anthocyanin content was elevated in AgNO3 treatments in a dose-dependent manner, while in 2mgL-1 and higher levels of AgNP treatments; it was increased and diminished, respectively. Proline content was reduced at 2mgL-1. However, an increase in proline accumulation was observed at higher levels of silver. Flavonoids were increased in treated plantlets in 2mg.L-1, while a reduction was monitored at higher levels. Total Phenolics were significantly increased in all treatments and no difference in H2O2 content was observed at 2mg.L-1 AgNO3 treatment in respect to the control, whereas it was increased in plantlets treated with AgNP at this level. MDA content was elevated in treated plants in 2 mgL-1. At higher concentration of silver, MDA content was remarkably increased. Based on our results we concluded that AgNP enhanced growth profile and roots and reduced abnormalities of plantlets arising in the culture vessel in potato plants grown invitro at low levels which probably referred to inhibitory effects on ethylene action. Furthermore, AgNP was more toxic than AgNO3 at higher than 2 mgL-1. This toxicity is probably attributed to induction of oxidative stress.

Keywords: Silver nanoparticle, Invitro, Oxidative stress

Effect of synthesis parameters on toxicity of chitosan/streptokinase nanoparticles

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Abstract:

Streptokinase is one of thrombolytic agents which mediates dissolution of fibrin in blood clot. Recently, delivery of Spa via nanoparticles has also gained a lot of popularity due to ability to control particles' size and loading capacity in nano-based systems. Size of Nanoparticles is close to that of cellular components (i.e. proteins), thus, they may pass through cell membrane and harm living cells. Therefore, toxicity assessment of nanoparticles is a necessity before using them in vitro /in vivo. In this study, chitosan and Streptokinase nanoparticles were prepared by selfassembly. Then, artificial neural networks were used for identifying main factors influencing the cytotoxicity of particles. Three variables, namely Chitosan concentration, pH of solution and stirring time were used as input parameters. Experimental data were modeled and validated against unseen data. The response surfaces generated from the software demonstrated that Chitosan concentration is the dominant factor which affects toxicity of nanoparticles. Increasing chitosan concentration leads to decreasing toxicity. Also increasing pH of solution has a direct effect on toxicity of particles. Increasing chitosan concentration and pH leads to increase nanoparticles size. Whereas probability and potential of interaction between cells membrane depend on nanoparticles sizes, small sized nanoparticles, passing through the membrane of cells more easily than the larger ones. It can be concluded that factors which affected size of particles could have an influence on toxicity of particles. Decreasing size of particles usually cause increasing of toxicity of nanoparticles. In conclusion for obtaining particles with minimum toxicity, concentration of Chitosan and pH of solutions must be adjusted carefully.

Keywords: Toxicity, Chitosan, Artificial neural networks

Zno nanoparticles effect on expression of P53 and RB genes

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Abstract:

Nanomaterials have been the center of attention of many researchers due to wonderful physicochemical properties observed of them. However, their toxicity potential necessitates performing an extensive amount of biocompatibility and toxicity studies before being clinically employed. ZnO nanoparticles (NPs) as metal oxide NPs, with wide industrial and biomedical application, have exhibited a range of cytotoxical effects on different cell types and negative effects on the survival and growth in In vivo studies. In this study ZnO NPs with 23 ± 11 nm sizes and concentration of 1600 ppm espoused to MCR5 cells for 72 hour. To evaluate expression of p53 gene in MRC5 cells culture, primers that detect prominent variants of p53 transcripts in lung fibroblast cells were used. The relative mRNA expression assay was performed in controlling and exposed cells with ZnO NPs. Results shows approximately 5-fold increase in expression of p53 in comparison to HPRT gene expression as internal control. Also 1.5 fold increase in expression of Rb is observed compared with HPRT gene expression. Expression of both genes increases in exposed cells, of which expression of p53 gene was more considerable. P53 gene expresses in stressful physiological situation and has been called guardian of the genome. The p53 tumor suppressor gene plays an important role in genomic response to DNA damage by cell cycle or apoptosis control and possibly plays an important role in toxicity of ZnO NPs. These findings may indicate a cellular response to toxic effect of ZnO NPs by different pathways including gene expression.

Keywords: ZnO nanoparticles,P 53 gene,RB gene

Facile green synthesis of silver nanoparticles using seed aqueous extract of Nasturtium officinale R.Br and its antibacterial activity

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Abstract:

In the present work, we describe the synthesis of silver nanoparticles (Ag-NPs) using seed aqueous extract ofand its antibacterial act Nasturtium officinale R.Br ivity. UV–visible spectroscopy, X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), transmission electron microscopy (TEM), scanning electron microscopy (SEM), and X-ray energy dispersive spectrophotometer (EDAX) were performed to ascertain the formation of Ag-NPs. It was observed that the growths of Ag-NPs are stopped within 35 min of reaction time. The synthesized Ag-NPs were characterized by a peak at 460 nm in the UV–visible spectrum. XRD confirmed the crystalline nature of the nanoparticles of 5-40 nm size. The XRD peaks at 38◦, 44◦, 64◦ and 77◦ can be indexed to the (1 1 1), (2 0 0), (2 2 0) and (3 1 1) Bragg's reflections of cubic structure of metallic silver, respectively. The FTIR result clearly showed that the extracts containing OH as a functional group act in capping the nanoparticles synthesis. Antibacterial activities of Ag-NPs were tested against the growth of Gram-positive (S. aureus) using SEM. The inhibition was observed in the Ag-NPs against S. aureus. The results suggest that the synthesized Ag-NPs act as an effective antibacterial agent. It is confirmed that Ag-NPs are capable of rendering high antibacterial efficacy and hence has a great potential in the preparation of used drugs against bacterial diseases. The scanning electron microscopy (SEM) , indicated that, the most strains of S.aureus was damaged and extensively disappeared by addition of Ag-NPs. The results confirmed that the Nasturtium officinale R.Br is a very good eco friendly and nontoxic source for the synthesis of Ag-NPs as compared to the conventional chemical/physical methods.

Keywords: Silver nanoparticles, Nasturtium officinale R.Br, Scanning electron microscopy (SEM)

Comparing antibacterial properties in mono polypropylene and bicomponent polypropylene polyethylene fibers containing silver nanoparticles

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Abstract:

As antibacterial attribute is the main property in the fiber which are used in hygienic products such as baby diapers, sanitary napkins and all that and on the other hand silver particles are the best materials with the minimum allergic reaction according to medical literature and also nano particles have much better properties with lower amount, in this study, using silver nano particles in mono polypropylene and bicomponent polypropylene polyethylene fiber has been investigated. To have permanent antibacterial property, particles have been used during fiber melt spinning production. As bicomponent fibers are used in thermo bonding process for producing different nonwovens, it was gained to use polypropylene with higher melting temperature in core and polyethylene in sheath layers to produce the fiber with better bonding and mechanical properties. Also nano silver masterbatch has been added in the sheath to optimize the amount of particles.

The results indicate that in bicomponent fiber with using the silver nano particles in the sheath layer, the same antibacterial properties comparing to mono fiber can be achieved with much lower amount of particles and this can have the most important affect in end-product finish cost.

Keywords: Antibacterial property,Silver nanoparticle, Mono and bicomponent fiber

Effect of nanocopper oxide on liver tissue in ross broilers

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Abstract:

Liver toxicity is the leading cause of drug or food supplements failure, so the advance could help streamline the drug and food industry development resulting in fewer toxic materials and a greater success rate for clinical and industrial trials. Therefore, the present study tries to investigate the effect of Nano Copper Oxide on the pathological changes of liver tissue in broilers. In this experimental study, 60 one-day female broiler chickens of Ross 308, with an approximate weight of 40 g were examined. The chickens were randomly divided into three groups of 20, control, experimental groups 1 and 2. The control group received water and food, and no special experimental material were feed orally or by injection. The experimental group 1 was feed one dose of 16 mg / kg/bw Nano Copper Oxide and experimental group 2 received two dose of 32 mg /kg/bw Nano Copper Oxide for 30 days. At the end of the period, the tissue sections were prepared from liver tissue. Our results showed the changes including congestion of central vein, congestion of sinusoids, and lymphocytic infiltration around the central vein, liver necrosis and vacuolization of the cytoplasm in the experimental group 2 in comparison to control.

Keywords: Nano copper oxide, Liver tissue, Broiler

Antimicrobial hydrogel as a nanoreactor and immobilizing matrix for silver nanoparticles

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Abstract:

Hydrogels are polymeric cross linked networks which are water-insoluble and hydrophilic and also able to retain a lot of water. Hydro gels offer large free space in swollen stage within the cross linked network and may act as a nano-reactor that not only provides a sufficient space for nucleation and growth of particles but also provides long term stability. Characterization studies established that hydrogel provides a controlled and uniform distribution of nanoparticles within the polymeric network without addition of any further stabilizer. The aim of this work is to develop chitosan–PEG-based hydrogel which act both as a nano-reactor and an immobilizing matrix for silver nanoparticles (AgNPs). With these, higher degree of biocompatibility and long-term antibacterial activity can be achieved. First of all we develop chitosan-PEG hydrogels with different ratio of polymers to find the best ratio for our work by characterizing the synthesized hydrogels. The hydrogels were characterized by measuring swelling ratio and water vapor transmission rate which are important according to our aim. Then at the appropriate ratio, hydrogels with different crosslinking densities were developed. The hydrogel containing AgNPs with different crosslinking densities were prepared by repeated freeze–thaw treatment. Silver nanoparticles inside hydrogel were prepared via in situ reduction of silver nitrate (AgNO3) using sodium borohydride (NaBH4) as reducing agent. In hydrogel network uniformly dispersed silver nanoparticles stabilized by the polymer network were obtained. The variation in cross-link density in the hydrogel network is a simple and facile synthetic strategy to control the size of the nanoparticles and regulate shape of nanostructures such as nanorods, nanocubes. The hydrogel containing AgNPs were well characterized by swelling behavior, antibacterial studies, XRD, UV-Vis spectrometry, scanning electronmicroscopy and transmission electron microscopy.

Keywords: Hydrogel, Nanoreactor, Anti-microbial

Antimicrobial effect of Curcumin-loaded starch nanoparticles on Streptococcus mutansbiofilms: using in dental caries

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Abstract:

Introduction: The purpose of modern dentistry is the early prevention of tooth decay rather than invasive restorative therapy. However, despite tremendous efforts in promoting oral hygiene and fluoridation, the prevention of caries lesions are still challenges for dental research and public health. Dental caries is caused by bacterial biofilms on the tooth surface, and the process of caries formation is modulated by complex interactions between acid-producing bacteria and host factors including teeth and saliva. Streptococcus mutans is a gram-positive endogenous bacterium to the oral cavity, which is deemed as the main cariogenic agent. The main virulence factors of S. mutans associated with cariogenicity include adhesion, acidogenicity, and acid tolerance. Therefore, novel approaches for developing oral care products, such as dentifrices and mouthwashes, rely on targeting these highly adaptable oral organisms and blocking their key mechanisms of phenotypic variation, are increasing. One major step forward in achieving this goal has been the development of antimicrobial systems that could effortlessly diffuse across all biofilm structures. For this purpose, there has been increasing interest in developing nanoscale systems to be used as biological carriers within biofilms. Of special interest are those nanoscale systems developed from natural polymers, e.g., starch. Also in associated with poorly water-soluble compounds, nanotechnology-based drug delivery systems have been proved to be prom¬ising platforms to enhance bioavailability and biological activities and targeting to cancer tissue or cells, which can open up a new avenue for poor in vivo action drugs like curcumin. Curcumin is a highly potent, nontoxic, bioactive agent found in turmeric that has inhibitory effect against sortase A, an enzyme which plays a role in influencing the cariogenicity in S. mutans.Methods: Techniques required for the production of polysaccharide nanoparticles containing curcumin in this investigation are precipitation and ionic gelation methods. To evaluate the effect of nanoparticle surface charge and its density on binding rate with enamel model material (hydroxyapatite), starch polysaccharide was used for nanoparticle production. Size and distribution of nanoparticles were performed by SEM and DLS analysis.Results: The aim of this research was to develop antibacterial compounds for preventing dental biofilm development. So, starch nanosystem was used to investigate S. mutans function on hydroxyapatite. Curcumin was utilized as a biological agent for loading into

nanoparticles. Results showed that nanosystem containing curcumin has an appropriate efficiency in biofilm reduction.

Keywords: Streptococcus mutans,Polysaccharide nanosystem,Curcumin

H_2S detection by carbon nanotube field effect transistor-based gas sensor

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Abstract:

The unique electrical properties of single-wall carbon nano-tubes (SWNTs) have generated a huge amount of research on nano-electronic devices and nano-sensors. Immobilization of H2S onto the sidewall of a semi-conducting SWNT is found to change the gate and drain control parameters of the Carbon Nanotube Field Effect Transistor (CNTFET). In this paper, we propose the effect of reaction between H2S molecules and the surface of the Single Wall Carbon nanotube (SWCNT) channel in a CNTFET device as a sensor. The theoretical basis of CNTFETToy is a model developed by Natori for ballistic FETs which was expanded upon by Rahman.

Ignoring mobile charge in the channel, the Laplace potential at the top of the barrier is then:The three α's in equation (1) describe the gate, drain and source's control over the Laplace solution and depend on the two-dimensional structure of the device.

Reaction between H2S molecules and SWCNT changes the surface charge and potential of the CNT channel, which in its turn, causes the corresponded variations in device characteristics. This reaction is simulated in Virtual Nanolab (VNL) software which leads to the changes in i-v curve of CNTFET through the affecting in gate control parameter and drain control parameter. We insert this parameters in FETToy area (a code developed under MATLAB) to extract the i-v curves. The curves comparison clearly shows that the H2S molecule will affect the performance of CNTFET as its sensor.

Keywords: CarbonNanotube,CNTFETSensor,Hydrogen Sulfide

Carbon paste electrode based on chemically modified carbon nanotube for determination of iodide and Cu2+ ion

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Abstract:

Novel carbon paste electrode (CPE) based on chemical modification of MWCNTs and its subsequently metalized with on-line pathway to obtain the 3- methoxy 2-((3-silylpropylimino) methyl) phenol chemically bonded to MWCNTs (MSPIMP–MWCNT and MSPIMP–MWCNT-Cu). These novel materials were fully identified and characterized by SEM, TEM and FT-IR. These ionophores as electro -active agent in the matrix of carbon paste applied with other ingredients such as (NaTPB), graphite powder and Nujol oil were mixed thoroughly and then packed into the hole of the electrode body. The influence of variables including sodium tetraphenylborate (NaTPB), ionophore, and amount of multiwalled carbon nanotubes (MWCNT), CuO nanoparticles, graphite powder and Nujol on the electrodes response were optimized by central composite design and surface response technology. At optimum composition of carbon pastes Cu2+ ions successfully was determined over a wide concentration range of 4.09×10-8-1.0×10-2 mol L-1 with detection limit of 1.6×10-8 mol L-1 and a Nernstian slope of 29.56 ± 0.56 mV per decadeof Cu2+ concentration. The electrode response is independent of pH in the range of 3.5;5.5 with response time lower than 20 s. The subsequent on-line complexation with metal ions candidate a novel material for construction of iodide selective electrode over 8.8×10-7-1.0×10-2 mol L-1 with detection limit of 4.1×10-7 mol L-1 and a Nernstian slope of -59.41 ± 0.78 mV per decadeof iodide concentration. On the basis of the results discussed in this paper, MSPIMP-MWCNT and MSPIMP-MWCNT-Cu are good and suitable neutral carriers for the construction of a carbon paste electrode for Cu2+ ion and iodide determination. The proposed electrodes have good operation characteristics performance such as high sensitivity, stability, response time, detection limit and wide linear range.

Keywords: Carbon paste electrode, Multiwalled carbon nanotubes, Chemically modified electrode

Size-dependent cytotoxic effects of ultra small ZnO nanoparticles under UV irradiation

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Abstract:

With the development of nanoscience, various types of nano-biomaterials have widely been used in the medicine and clinical setting (e.g., diagnosis and cancer therapy). In this context, one of the interesting nanoparticles is quantum dots (QDs) with unique and tunable optical and targeting properties. ZnO as a quantum dot, which belongs to the group II-VI semiconductors, has a wide energy gap and large exciton binding energy. Additionally, Nano-scaled ZnO is able to play a role as a photocatalyst, which could generate the ROS (Reactive oxygen species) under irradiation procedure. Consequently, this agent can induce a double-strand breakage (DSB) of the DNA together with the cellular toxic effects. In our research, we have investigated the ROS generation of ZnO nanoparticles with different sizes, under UV irradiation and studied cytotoxic effects of these nanoparticles on Hela cells. The ZnO nanoparticles were prepared by using different conditions to synthesis different size ultra smallZnO nanoparticles with a narrow size distribution (from 2 up to 5.5 nm). UV-VIS spectroscopies and the Tauc plot application have been used to size determination. ROS generation and cytotoxic effect of different-sized ZnO nanoparticles was assessed by DPPH as a radical scavenger molecule, in dark and under 3, 5, 10 min UVC (k = 254 nm and 0.1 mW/cm2) irradiation times. Apoptosis and necrosis in HeLa cells were detected by MTT assay. A Significant increase in ROS generation was observed due to the size elevation and increased irradiation times. Meanwhile, it was observed that UV irradiation could enhance the suppression ability of ZnO nanoparticles on cancer cells proliferation, and these effects were in the size-dependent manner. The apoptotic effect and ROS generation of ZnO NPs was marked up to a concentration of 0.05 mgr/ml and size of 5.5 nm. Based on our results, the different size ZnO nanoparticles with the smaller-scale (up to 10nm) have a reverse size-dependence ROS generation activity in comparison with the large scales (>10). It is hypothesized that, in some cases with the increased surface area to volume ratio, the number of surface atoms have been decreased that could be causing of an activity reduction.

Keywords: ROS, Size-Dependent, ZnO NPs

Synthesis, characterization, and antibacterial activities studies of silver nanocomposite

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Abstract:

In this study, a group of nano alkaline earth metal fluorides, which have very wide applications in various fields-have been synthesized and studied. The general formula for these compounds is MF2, where M = Mg, Ca, Sr. strontium fluoride Nanoparticles was used ,for synthesis of strontium fluoride- Magnesium oxide inorganic nano-composite by ultrasonic method. These compounds were characterization by infrared spectroscopy (IR), ultraviolet spectroscopy (UV) and some other physical properties as well as the size and structure of nanoparticles synthesized were identified by X-ray diffraction (XRD) and surface morphology and the structural model developed by scanning electron microscopy (SEM) were studied. Fluoride compounds have antibacterial properties. Antibacterial properties of these materials on Cocos staphylococcal bacteria aureus, Escherichia coli and Bacillus subtilis, was studied.

Keywords: Nano Fluorides, Scanning Electron Microscope, X-ray diffraction

The toxicity of copperoxidenanoparticles in ross broilers

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Abstract:

Nanoparticles are used in a variety of medical and consumer products because of their antibacterial activity. However, there is limited information about their toxicity potential. The present study has investigated the level of lipid peroxidation in the presence of CuONanoparticles (by measuring malondialdehyde) and ceruloplasmin as an antioxidant enzyme. In this studyRoss broilers were divided into 2groups. The control group received only food. Experimental groups1 and 2 received respectively 16and 32 mg/kg/bwCuO Nanoparticles since5 days old for 30days.SerumMDA and Cp levels were measured in the venousblood samples taken at the end of treatment. Base on the results ceruloplasminlevels, at two different doses, showed no significant change. However, Malondialdehyde level in the group receiving the higher dose of CuO Nanoparticlesshowed significant increase. In conclusion CuO Nanoparticles in the higher doseshowedtoxicity due to inducing oxidative stress in the broilers

Keywords: CuO Nanoparticle, Ceruloplasmin, Malondialdehyde

Study on antibacterial activity of polyester fabric finished by allicin-conjugated nanocellulose

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Abstract:

An extensive effort has been done in the textile industry to stop the rapid growth of microorganisms. Therefore, the development of textiles has been converted to special demand. The main antimicrobial agents used in textiles include organo-metallic compounds, phenols, quaternary ammonium salts and organo-silicons. To be successful in the marketplace, these finishing agents should be durable and have selective activity towards undesirable organisms. In this study, the antimicrobial properties of polyester fabric finished by allicin-conjugated nanocellulose were evaluated against Staphylococcus aureus (Gram positive bacteria) by AATCC 100-1993 test method. Moreover, chemical changes, morphology and washing fastness of finished fabrics were investigated. Analysis was performed using XRD to investigate the crystalline structure of samples. The crystal size of polyester sample was measured as 84.64 A0 by XRD analysis. From FTIR, it was found that the specific absorption peak of conjugated polyester fabric due to –NH amide stretching. This can be related to the linkage between the amine group of allicin and carboxy-nanocellulose. The SEM image of finished fabrics with allicin-conjugated nanocellulose shows the accumulation of material on the sample surface, although it was absent on the raw fabrics surface. The results of antimicrobial properties on finished fabrics with allicin-conjugated nanocellulose showed that the polyester fabric has the very good antimicrobial activity against the selected bacteria.

Keyword: Nanocellulose, Allicin, Antibacterial properties

Biosynthesis and characterization of selenium nanoparticles by Acinetobacterjuniiand its antibacterial activity

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Abstract:

Selenium and its nanoparticles have an extensive range of applications. Therefore, the development of clean, nontoxic and eco-friendly biological methods for the production of Se NPs deserves merit. The aim of this study was biosynthesized of selenium nanoparticles (SeNPs) by Acinetobacterjunii and its structural characterization and investigate its antibacterial activity. Acinetobacterjunii was isolated and purified from glass factory sewage and identified by 16SrRNA gene analysis.

Selenium nanoparticles were extracted from culture of bacterium using centrifugation and disrupting cells by liquid nitrogen. Disrupted cells were resuspended in Tris-HCl buffer and washed in chloroform and ethanol. Purified Se nanoparticles were characterized by Transmission Electron Microscope (TEM), Dynamic Light Scattering (DLS), Energy Dispersive Spectroscopy (EDS) and Scanning Electron Microscopy (SEM) and the growth of Staphylococcus aureus in the presence of Se nanoparticles was examined.

The appearance of red color in the culture plate suggested the formation of selenium nanoparticles. Isolated bacterium identified as Acinetobacterjunii by biochemical and morphological characterization and also 16S rRNA gene sequencing. The biosynthesized Se nanoparticles were with the size range of 13nm to 54nm with an average size of 95nm. The TEM and SEM analysis revealed that the SeNPs were spherical in shape.The EDS spectrum of SeNPs was indicated the presence of strong peak at1.5keV means that SeNPs entirely composed of Se. Results of this study also provided the evidence of strongly inhibited growth of Staphylococcus aureus in the presence of SeNPs at concentration of 30g/mL.

In conclusion, the results of our study showed that the Acinetobacterjunii has the potential for production of selenium nanoparticles and can be suggested as a promising alternative for the large-scale commercial synthesis of SeNPs. Furthermore, these nanoparticles may be used to effectively prevent and treat Staphylococcus aureus infections but should be further studied for such applications.

Keyword: Acinetobacterjunii,Selenium nanoparticles,Biosynthesis

Medical faculty researchers' attitudes on the ethical issues related to biological DNA materials usage

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Abstract:

DNA nanotechnology, uses the nucleic acids and components of natural biological systems to engineer innovative nanodevices. DNA not only is a key biological information storage molecule but also become a preferred material for nanotechnologists because of its unique properties of structural stability, programmability of sequences, and predictable self-assembly.DNA has been the subject of many medical researches such as biobanking, gene therapy, genetic engineered products and cloning. From the early stages of growing the nanotechnology, social and ethical challenges have been raised in parallel and begun to emerge. Research endeavors with the subject of DNA, have been in center of attention particularly. Issues like hazardous effects of genetic manipulated products or recombinant DNA on the environment, confidentiality and safety in biobanking, informed consent forms, the domain of interference of DNA as an advanced nanomaterial in the environment and nature have been the most challenging areas. The basic knowledge and attitude of researchers of medical faculty in Mashhad University of Medical Sciences con some ethical issues of DNA usage as a nanosized biomaterial has been studied in a cross-sectional study. Data gathering tool was a self-administered questionnaire. The results of our study showed that approximately over 50% of M.Sc. students and 70% of Doctoral researchers had a good knowledge about biobanking, gene therapy, genetic engineered products and cloning issues. Also, on average almost75% of the researchers tend to preserve their DNA samples for possible future usage. They believed that patients should be aware about how their biological samples (including DNA) preserveor dispose.

In conclusion, the study showed that researchers feel responsible against human and environmental dilemmas (issues) related to DNA. Also they believe that policy makers and governmental authorities should have a regulatory approaches with the aim of generate a safe practice and use of biological DNA materials.

Keyword: DNA,Nanoethics,Medical faculty

An evaluation of quantum dots to detect blood fingermarks

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Abstract:

In the frame of an investigation on crime scene or related evidence, one of the major goals for investigators is the detection of fingermarks that were left on objects or surfaces by individuals. During the last decade, several studies have focused on the development of new detection methods based on the use of nanoparticles (NPs) to detect fingermarks. More recently, researchers stabilized QDs in petroleum ether by grafting aliphatic chains on their surface and tried to detect sebaceous fingermarks on silicon wafers and paper substrates. A new and original reagent based on the use of highly fluorescent cadmium telluride (CdTe) quantum dots (QDs) in aqueous solution is proposed to detect weak fingermarks in blood on non-porous surfaces. To assess the efficiency of this approach, comparisons were performed with one of the most efficient blood reagents on non-porous surfaces, Acid Yellow 7 (AY7). Four non-porous surfaces were studied, i.e. glass, transparent polypropylene, black polyethylene, and aluminum foil. The results showed that QDs were equally efficient to AY7 on glass, polyethylene and polypropylene surfaces, and were superior to AY7 on aluminum. The use of QDs in new, sensitive and highly efficient latent and blood mark detection techniques appears highly promising. Health and safety issues related to the use of cadmium are also discussed. It is suggested that applying QDs in aqueous solution (and not as a dry dusting powder) considerably lowers the toxicity risks.

Keywords: Nanoparticles, Quantum dots, Latent fingermarks

Nanosilver induced abnormalities in kidney and spleen: a sub-chronic dermal toxicity

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Abstract:

Silver nanoparticles have been widely used as antimicrobial agents in various products. Present study compares the tissue levels of silver nanoparticles in different organs of Guiana Pigs. Before the colloidal silver nanoparticle toxicity evaluation, their size was subjected in sizes < 100 nm by Transmission Electron Microscope and revealed that the nanoparticles contained nanosilver by X-Ray Diffraction. For toxicological evaluation, male guinea pigs were exposed to three concentrations of nanosilver (100, 1000 and 10000 µg/ml) in subchronic model in a period of 13 weeks. Tissue levels of nanosilver and tissue uptakes happened in dose-dependent in kidney and spleen. In histopathological studies, severe proximal convoluted tubule degeneration and distal convoluted tubule were seen in the kidneys of the middle and high-dose animals. In spleen, the highest levels of red pulp inflammation, white pulp atrophy, and thinnest capsules were seen in the high-dose group. The three different nanosilver concentration gave comparable results for histopatological changes in tissues. It seems that Ag ions could be detected in organs after dermal exposure, which has the potential to provide target organ toxicities in dose dependent manner.

Keywords: Nanosilver, Nephrotoxicity, Dermal toxicity

Nanosafety practices: A reported study in research laboratories of Isfahan Iran

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Abstract:

Background: Nanoparticles have potentially the possibility of an adverse impact on human health and the environment. It is a reason for concerning about their toxic effects and therefore various guidelines on handling nanoparticles have been published. Moreover, they can bind or react with other hazardous pollutants in water or air and therefore entry into the body so much easier. Although nanoparticles have many benefits for human's life but they potentially could be serious risk.

Materials and Methods: In this study, the procedure was that a questionnaire consisting of 6 parts were completed by staffs which work at the research centers (work with nanomaterials) in Isfahan and the data were collected. The collected data were analyzed using the SPSS software.Results: The results showed that more than 73% of the researchers do not use personal protective equipment during the work and 98% do not use gloves or use normal gloves. 93% of researchers do not use special was to waste disposal. This is despite the fact that more than 63% of researchers believe that nanoparticles are dangerous particles. Moreover, 80% of researchers agree with entering the nanoparticles to air during the synthesis and their application.
Conclusion: The results show that the protective rules observance by the research staffs is very poor and it is essential to have a vast occupation health control program in order to moderate and improve the nanomaterials protection.

Keywords: Nano, Nano safety compliance, Nanotechnology

Antimicrobial effect of iron oxide nanoparticles in treatment of cutaneous infection due Pseudomonas aeruginosa inmouse model

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Abstract:

Pseudomonas aeruginosa is an important life-threatening nosocomial pathogen and plays a prominent role in serious infections in burned patients. Pseudomonas aeruginosa has become an important cause of infection, and it is a frequent cause of nosocomial infections. Pseudomonas infections are complicated and can be life-threatening. Although many methods for diagnosing and treating of infectious diseases currently exist, there is an urgent need for new and improved approaches for bacterial destruction. The aim of this study was to investigate the usage of Iron oxide nanoparticles for treatment of Pseudomonas Cutaneous infection. The Antimicrobial effect of Iron oxide nanoparticles was investigated by using 15 mice with bacterial Skin burn infection that was induced by Pseudomonas aeruginosa. Anti microbial effect of Iron oxide nanoparticles against skin infections due to P.aeruginosa was approved in mouse model. The results showed iron oxide nanoparticles declined the number of bacteria in local burn wounds of BALB/c mice. our findings indicated that iron oxide nanoparticle is more efficient and might have significant therapeutic implications.

Keywords: Iron oxide nanoparticles, Pseudomonas aeruginosa, Cutaneous infection

Antimicrobial effect of chitosan hydrogel composite of coral nanoparticles for dental plaque treatments

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Abstract:

Nanotechnology is a promising approach to be applied in to the microbial dental biofilms. Although many substances have been presented throughout the years as antimicrobial agent, many compounds have failed in clinical examinations due to their weak ability to reduce the existing dental biofilm. The natural substance that presents throughout the years the best antimicrobial effect is chitosan and has led several groups to use in different techniques in biomedical applications. Chitosan (1-4, 2-amino-2-deoxi-b-D-glucana) is a deacetylated derivative from the biopolysaccharide chitin with an excellent biocompatibility, high bioactivity, biodegradability, polyelectrolyte action, antimicrobial activity, chelation ability and absorptive capacity. In this study, By the aid of abrasive property of nano sized particles the penetration of antimicrobial effect of chitosan into the biofilm facilitated. Chitosan hydrogel prepared in acetic acid-water (AA-water) solution (2 wt%) and before gel preparation coral nanoparticles added to the solution. Coral nanoparticles were evaluated with scanning electron microscopy (SEM), and chitosan hydrogel synthesis process followed by pH measurement during the phase nanoparticle fixed in hydrogel. Fourier transform infrared spectroscopy (FTIR) of the sample was performed. According to the result, the final pH of the prepared hydrogel is around 4.5 and by applying the chitosan hydrogel content into the biofilm the formation of biofilm decreased and nanoparticle abrasive ability broke up the biofilm attachment on the dental surface while the microbial biofilm weakened by the presence of chitosan hydrogel.

Keywords: Nanoparticle, Chitosan, Microbial biofilm

Electrochemical investigation of catechol at gold–sodium dodecylbenzenesulfonatenanoparticles modified glassy carbon electrode

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Abstract:

A large variety of phenolic compounds are widely used in the chemical industry, oil refinery and pharmaceutical preparation. The identification and quantification of these compounds are important for environmental monitoring because many of them are toxic contaminants in medical, food and environmental matrices and have harmful effects on plants, animals and human health. Many analytical methods are available for their determination, such as capillary electrophoresis and high performance liquid chromatography. These methods are very expensive and time-consuming. Therefore, researchers prompted to develop different types of sensors for detection of phenolic compounds. Gold nanoparticles (AuNPs) have good conductivity and strong adsorption ability. Furthermore, AuNPs can promote the electron transfer. AuNPs are usually used in many sensors. A method was designed to construct an electrochemical sensor for detection of phenolic compounds based on electrodeposition of gold–sodium dodecylbenzenesulfonate nanoparticles onto a glassy carbon electrode (GCE). GCE modified with gold nanoparticles was prepared using electrodeposition at constant potential of -0.40V during 300 seconds, and characterized with Atomic force microscopy (AFM) and electrochemical techniques. Cyclic voltammetry (CV) was employed to study the electrochemical behaviors of catechol at the modified electrode in the presence of sodium dodecylbenzenesulfonate. The oxidation and reduction peak potentials showed negative and positive shifts respectively in the presence of sodium dodecylbenzenesulfonate indicating that the electron transfer between the electrode and bulk solution of catechol was facilitated. In comparing CV peaks of catechol at modified and bare GCE, modified electrode shown higher current peaks. In pHs from 2 to 9, pH 3 was the optimum pH to study electrochemical behavior of catechol. AFM shown that gold–sodium dodecylbenzenesulfonate nanoparticles are deposited onto GCE.

Keywords: Phenolic compound, Gold nanoparticles, Electrochemical behavior

Alumina nanoparticles interaction with hairy roots of Linumpersicum

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Abstract:

Over the recent decades, there have been rapid increases in use of nanotechnology. Undoubtedly, by this expansion of nanoparticles applications and production, their environmental impacts on our environment are becoming increasingly significant. Several researches have been done to comprehend their effects on the environment especially with the focus on toxicity. These studies toward plants as the fundamental component of an ecosystem are of special importance. Moreover, the entry of nanoparticles into food webs raises a great concern.

To the best of our knowledge, general consequences of nanoparticles exposure for plants still remain unclear; even though considerable experiments dealing with the way by which nanoparticles affect some plant growth indicator like root elongation and seed germination rate have been carried out. Therefore, we have investigated alumina (Al2O3) nanoparticles interaction with hairy roots of Linumpersicum as a root model. Alumina nanoparticles have been announced as the priority for toxicological studies.

Hairy roots were developed by seedling of L.persicum that were infected by Agrobacterium rhizogenes. After reaching adequate amounts of hairy roots in the McCown culture media, they were categorized into three groups based on culture media component: controls, nanoparticles, bulk alumina. Characterization was performed in 30 days with intervals. Changes in dry and fresh biomass, genotoxicity and metabolite production yield in three groups were measured in triplicate. Uptake and accumulation of nanoparticles in roots and morphological changes were observed via light and electron microscopy.

Finally, this research results in the implication of either alumina nanoparticles in this specific research circumstances would be toxic or advantageous.

Keywords: Alumina, Hairy roots, Interaction

Synthesis, cytoxicity assay and invitro imaging of targeted water soluble cadmium sulfide quantum dots

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Abstract:

Quantum dots are colloidal nanocrystalline semi-conductors that due to their high quantum yield of the fluorescence emission can be used as luminescent probes and attract many researches [1]. The functionalization of the QDs is a crucial step for producing QDs with specific targeting properties and permeability via cell membrane [2]. In this work cadmium sulfide quantum dots were synthesized and solubilized in water by mercaptoacetic acid (MAA). The human transferrin protein was covalently bonded to the MAA capped quantum dots. The human transferrin receptor is a membrane-bound protein and is highly expressed on malignant cells. The fluorescence microscope confirmed that that the QD-TF probes were successfully entered to MCF-7 breast cancer cells via receptor mediated endocytosis. Dynamic Light Scattering (DLS) at a scattering angle of 90 degrees was used as the basic principle for measurement of particle size. Zetasizernano uses a laser with 633 nm wavelength. The 100 number percent of the particles in the colloidal solution had the diameter of 8.13 nm. Also the colloidal potential of the particles was – 42 mV. The zeta potentials below – 30 mV and above + 30 mV prevent the aggregation of colloidal particles. Quantum yield of synthesized nanoparticles determined by Rhodamine 6G and was about 74 percent. The toxicity of modified QDs was assessed by 3-[4,5-dimethylthiazol-2yl]-2,5-diphenyltetrazolium bromide (MTT) assay based on the formation and colorimetric quantification of enzyme activity. The results showed that 12.5 % cell growth inhibition due to QDs toxicity.

Keywords: Quantum dot, Cadmium sulfide, Transferring

Electrochemical nanobiosensor for detection of hydrogen peroxide

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Abstract:

In this report, electrochemical nanobiosensor based on cobaltferritin immobilized on a self-assembled monolayer (SAM) modiﬁed gold electrode for determination of hydrogen peroxide (H2O2) in phosphate buffer solution (pH 7.5) was investigated. The physiological levels of H2O2 are involved in degradation and formation of reactive free radicals which can cause damages to parts of cells such as proteins, DNA, and cell membranes. H2O2 has been accepted as a food additive of controlling the growth of microorganisms, bleaching, removing glucose from dried eggs and controlling microbial growth in stored milk before cheese-making. Therefore, determination of H2O2 concentration is practically important. Ferrtin is a iron storage protein with 24 polypeptides subunits arranged with 432 symmetry to form nearly spherical molecules 12 nm in overall diameter with hollow interiors 8 nm in diameter. In addition, findings that ferritin can be reconstituted with various electroactivenanomaterials (Co, Mn, Ni) make ferritin suitable for nanobiosensor applications. In this study, we synthesized cobalt nanoparticles in cavity of apoferritin using H2O2 as the oxidant agent at 8.5. The gold electrode was modiﬁed using succinimidylalkanedisulfide compound. Cobaltferritin was then covalently attached to the modified Au electrode through the reaction of the terminal succinimidyl groups with amino groups of ferritin molecules. Compared to the bare gold electrode, the cobaltferritin immobilized on DTSP-modified gold electrode displays high electrocatalytic activity towards the oxidation of H2O2, a linear dependence (R=0.989) on the H2O2 concentration from 2.49×10-9 M to 1.91×10-8 M, a high sensitivity of -4×108 µAM-1. The electrooxidation of nanomolar H2O2 solutions was performed using modified gold electrode. Significantly lower detection limit, grater analytical sensitivity and stability response of this modified electrode compare favorably to all other modified electrode employed as H2O2 sensors.

Keywords: Nanobiosensor, Hydrogen peroxide, Apoferritin

Evaluation of the effect of copper oxid and aluminum oxid nanoparticles on the formation of biofilm in Candida albicans

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Abstract:

Recently inorganic nanomaterials characterized with high level thermal stability and new physical and chemical properties were considered for antimicrobial therapy. In the present study, the antifungal activity of copper oxide and aluminum oxide nanoparticles was evaluated against pathogenic yeast Candida albicans. For the first stage, physical and chemical properties of nanoparticles used in this study were checked and confirmed by means of double-beam ultraviolet-visible spectrometer, X-Ray diffractometerunderCuKα beam emission, and transmission electron microscope. Subsequently the minimum inhibitory concentrations value (MICs) of nanoparticles was calculated using broth microdilution test. Time kill staudy was also performed to show the effect of antifungals to inhibit the growth of Candida by time. Eventually crystal violet (CV) assay was carried out to investigate the biofilm-inhibitory properties of nanoparticles tested agains Candida albicans. Our results showed that nanoparticles tested could be able to inhibit the growth of sessile Candida cell as well as biofilm significantly. Indeed MICs was ranged from 0.42 g ml-1 and 0.84 gml-1 for copper oxide and aluminum oxide nanoparticles respectively. CV results also showed the significant reduction of biofilm in Candida after treatment by nanoparticles tested at level p ≤ 0.05. Furthermore, it is also demonstrated that the copper oxide nanoparticles showed more antifungal activity than aluminum oxide against Candida albicans. These favorable results need to be supported by animal modeling.

Keywords: Biofilm Candida albicans, Copper oxide nanoparticle, Aluminum oxide nanoparticle

Mycosynthesis of silver nanoparticles using the yeast Candida albicans and evaluation of the antibacterial effect

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Abstract:

Obtain the nanoparticles with the ability to control, reduce costs and environmental pollution is the outstanding goals in nanotechnology. Recently, the synthesis of nanoparticles with biological living systems, has led to a new branch in nanotechnology. Silver nanoparticles is a one of nanoparticles that most widely used. In the present study using the yeast Candida albicans for synthesis of silver nanoparticles and evaluation of the antibacterial effect. In this study, using the standard strain Candida albicans (ATCC 14053) and 15 clinical isolates were identified by morphological observations and biochemical tests. For the first step, the ability to produce nanoparticles by yeasts in the presence of 3.5 mM silver nitrate concentrations were measured. Then the strains were immersed in the presence of 1.5 mM silver nitrate, the PH to 7 for 48 hours. After The color change of the solution, separation yeast biomass and was evaluated with spectrophotometric UV-vis and electron microscopy, SEM. Finally, the effect of synthesis silver nanoparticles evaluated against gram-positive and gram-negative bacteria. Our results showed that the strains in this study, only a clinical strains Has the ability to producing silver nanoparticles. After Observation color changing in solution of Silver nitrate and clay-spectrum UV-vis, and electron microscopy SEM were detected that yeast Candida albicans has ability to producing extracellular silver nanoparticles the with The range of 20 to 80 nm with different morphologies. It was also shown that the nanoparticles has a good antibacterial effects against bacteria are studied. Our results showed that the yeast Candida albicans has an ability to produce silver nanoparticles.

Keywords: Mycosynthesis of nanoparticle, yeast Candida albicans, Antibacterial effects

Phytosynthesis, characterization and antibacterial activity of zinc oxide nanoparticles

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Abstract:

The use of plant extract in the phytosynthesis of nanoparticles can be an eco-friendly approach and have been suggested as possible alternative to conventional method namely physical and chemical procedure.

In this study we present on the phytosynthesis of zinc oxide nanoparticles by both microwave-assisted method and conventional phytosynthesis method. Stable and spherical ZnO nanoparticles were produced using different concentration of zinc nitrate and Rosa canina flesh extract which was used as precursor. Flesh extract act as reducing and capping agent for creation of nanoparticles.

Structural and morphological properties and particle size of synthesized zinc oxide nanoparticles have been confirmed by X-ray Diffraction (XRD), Scanning Electron Microscope (SEM), Fourier transform Infrared (FT-IR) and Dynamic Light Scattering (DLS). We also investigate antibacterial activity agaimstL.monocytogenes, L.monocytogenes and E.coli.

The present investigation reveals that zinc oxide nanoparticles have the potential for various medical and industrial applications so, that the investigation is so useful and helpful to the scientific communities.

Keywords: Phytosynthesis, Zinc oxide, Nanoparticle

Neuroprotective effects of curcumin on inflammation of microglia cells induce by zinc oxide nanoparticles

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Abstract:

In the last decades, zinc oxide nanoparticles (ZnO NPs), as a new type of high-functional nanoparticles, have been widely used in cosmetics, food additives, and Pharmaceuticals. With the increased application of ZnO NPs, the concerns about their safety have also been increased. It has been known that with decreasing particle size, nanoparticles can easily accumulate and migrate deeply in the body. And also demonstrated that inhaled nanoparticles were translocated to the central nervous system through the olfactory neuronal pathway, resulting in inflammatory changes and brain edema formation. ZnO NP have a cytotoxic effect on different cells and induce inflammatory response and oxidative stress. Inflammation in the brain is characterized by the activation of microglia, the resident immune cells in central nervous system.

In the other hand curcumin is a molecule found in turmeric root that has anti-inflammatory, antioxidant, and anti-tumor properties and has been widely used as both an herbal drug and a food additive. In the present study, the anti-inflammatory effect of curcumin on the ZnO NP- induced inflammation response in microglial cells was investigated.

For prove this hypothesis,the microglia cell cultured in DMEM media with10% FBS,and treated with and without curcumin in the presence of neurotoxic ZnONP . We used MTT analysisand morphology images and flow cytometry analysis.

We found that curcumin treatment inhibited ZnO NP-induced microglias morphological changes. ZnO NP profoundly induced microglia cells to produce ROS which is a hallmark of neurodegenerative disease and curcumin reduces production of ROS and inflammatory mediators.

Keywords: ZnO NP, Microgliainflammation, Curcumin

Effect of hard corona on uptake and cellular toxicities of the gold nanoparticle

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Abstract:

Gold nanoparticles are known as one of the most promising nanomaterials for their unique and attractive physicochemical properties such as ease of synthesis, chemical stability, and unique optical properties. Due to such properties, Gold nanoparticles are considered for several biomedical applications such as chemical sensing, biological imaging, drug delivery, photothermal therapy and cancer treatment. It has been demonstrated that interaction of nanomaterials with physiological uids, biomolecules and in particular proteins forms a complex between surface of nanoparticles and proteins called corona. Therefore, in comparison with the surface characteristics of the nanomaterials, the composition of the protein corona has more determinant effects on interaction of the biological system with the nanomaterials. Thus it is important to understand the underlying interactions of the nanomaterials in biological medium, which can play a key role in understanding of toxicological aspects of these materials. It is believed that these kinds of interactions can lead to the alleviation of unwanted toxic effects. Therefore, we designed this study to evaluate the toxicity of the gold nanoparticles with various human plasma corona in HT-29 and A549 cells. Our results demonstrated that the increase in human plasma concentration caused significant increase in gold nanoparticles induced-cellular toxicity. Fluorescence microscopy of HT29 and A549 cell lines showed that different incubation period with human plasma affected reactive oxygen species (ROS) produced by gold nanoparticles.

Keywords: Gold nanoparticles, Nanoparticle toxicity, Protein corona

Evaluation of cytotoxicity and biological activity of novel biogenic selenium nanoparticles in comparison to selenium dioxide in HepG2 cells

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Abstract:

The main objective of this study was to investigate the biologic activity and cytotoxicity of Selenium nanoparticles (SeNPs) biosynthesized by a newly isolated marine bacterial strain Bacillus sp. MSh-1. Transmission electron micrograph (TEM) of the puried Se NPs showed individual and spherical nanostructure in size range of about 80–220 nm. Cytotoxic effect of the biogenic SeNPs and Selenium dioxide (SeO2) on HepG2 cell line was assessed by MTT assay. Higher IC50 of the SeNPs (54.53 µg/mL) compared to SeO2 (9.75µg/mL) rmed lower cytotoxicity of the biogenic SeNPs on HepG2 cell line. Hepatic damage markers analysis revealed that alanine transferase (ALT), aspartate aminotransferase (AST) and lactate dehydrogenase (LDH) activities were significantly increased in the SeO2 treated groups whearas no significant change was observed in HepG2 cells treated with the same concentrations of SeNPs. These results indicate that biogenic SeNPs has lower toxicity compared to SeO2 on HepG2 cell line.

Keywords: Biogenic selenium nanoparticles, Selenium dioxide, Cytotoxicity

Ultrasound and precursors affect the crystallinity, morphology, and antibacterial activities of ZnO nanoparticles

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Abstract:

In the present study, ZnO nanoparticles (NPs) as antibacterial agents have been synthesized from two different precursors in the presence and absence of ultrasound. The effect of starting materials and the method of synthesis were investigated on the properties of the ZnO NPs. The crystallographic structures of all samples have been characterized by X-ray diffraction (XRD) and the strength of Zn-O bond for all samples have been determined and compared by mid-infrared (mid-IR) and far-infrared (far-IR) spectroscopy techniques. The morphology of the products has been studied by transmission electron microscopy (TEM). Based on the results, the mechanisms for the growth of ZnO NPs have been proposed for the samples prepared under different conditions. The antimicrobial activity of the resultant powders toward Escherichia coli as a model of microbe has been evaluated by absorption and colony count methods in the form of nanofluid.

Keywords: Sono-synthesis, ZnO nanoparticles, Antibacterial activity

In vitro and in vivo evaluation of poly (caprolactonefumarate) nanoparticles

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Abstract:

In this study, the biodegradable and bicompatiblePoly(caprolactonefumarate) (PCLF) was considered as a candidate for preparation of lymphoma targeted nanoparticulate drug delivery system because of its hydrophobicity.

The three synthesized PCLFs (named as PCLF530, 1250 and 2000) with different Mw and hydrophobicities were used to prepare nanoparticles (NPs) bynanoprecipitation method. The mechanism of doxorubicin HCL (Dox) release from PCLF NPs and the cytotoxicity and cellular uptake of them were investigated.

The spherical Dox loaded PCLF NPs with a diameter of 225 nm (with narrow size distribution) and a zeta potential of about -40 mV, showed a maximum release percent of 80% during 4 days with an initial burst release of about 20% in PBS pH 7.4, while in PBS pH 5.8 although the duration of release was the same 4 days but the maximum release percent was higher than that for pH 7.4. Empty PCLF NPs did not cause a considerable cytotoxicity on T47D, HT29 and 3T3NIH cell lines. The cytotoxicity of Dox loaded PCLF NPs on these cells were almost equal to the Dox solutions. Images showed T47D intracellular green fluorescent color after 48 hours incubation with FITC loaded PCLF NPs. In vivo images showed fluorescent signals of DiR in liver, spleen and other lymphatic tissues compared to the DiR solution, indicating the retention of DiR loaded PCLF NPs in such organs.

PCLF NPs beside their suitable size, surface charge and spherical shape, as a nanoparticulate drug delivery system, not only could load Dox and control its release, but also could be uptaken by T47D cells as model cell line in vitro and show considerable cytotoxicity on cells. Moreover, at in vivo experiments, they could be uptaken by lymphatic system cells and be retained there for two days.

Keywords: Poly (caprolactonefumarate) PCLF, Nanoparticles, In-vivo imaging

Effect of coating on the surface zirconium nanoparticles in develop safety against self-ignite

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Abstract:

Zirconium metallic nanoparticles are very active and ignite intensely when exposed to air. One of the ways to prevent it, the coating on the surface of the nanoparticles. In this research, zirconium nanoparticles were synthesized by metallothermal. In this method, reaction of commercial ZrO2 with Mg powder was carried out in a closed stainless steel cell under nitrogen inert gas, at 750 °C for 2 hours. On completion of the reaction, the additionally formed MgO is removed by treatment with acid. Product was mixed with viton as coating material/agent, since viton is easily dissolved in acetone. Size and morphology of the nanoparticles synthesized were investigated by Scanning Electron Microscopy (SEM), while the purity of the product was determined by X-ray Diffraction. Effects of the Viton concentration on measurable area of the static electric sensitivity were investigated by Electrostatic Discharge Sensitivity test (EDS). Pure zirconium nanoparticles with an average size of about 20 with a spherical morphology were obtained. Increasing concentrations of viton causes static sensitivity is reduced.

Keywords: Zirconium , Self-ignite ,Static sensitivity

An anti-bacterial study on sol-gel derived copper free and copper-incorporated bioglass systems on aerobic bacteria

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Abstract:

That's the propose of this study to evaluate the antibacterial effects of copper free bioactive glass (45SBG) and copper-incorporated bioactive glass (Cu45SBG) nanopowders against Escherichia coli (E. coli) and Staphylococcus aureus (S. aureus) bacteria as the most important pathogens in nosocomial infections.

The sol-gel technique was used to synthesize the different compositions of BGs. Various spectroscopic techniques, containing Field emission scanning electron microscopy (FESEM), transmission electron microscopy (TEM), X-ray diffraction (XRD) and energy dispersive X- ray analysis (EDS) were used to characterize these nanopowders. The antibacterial activity of nanopowders was measured by determining the minimum bactericidal concentration (MBC). BG nanopowders at different concentrations (100, 50, 25, 12.5 and 6.25 mg/ml of broth) were used for antibacterial tests. Calcium concentration in the culture medium containing nanopowders was measured by Atomic absorption spectrophotometer (AES). Release of Ca, and Cu iones into the simulated body fluid (SBF) was measured by using inductively coupled plasma optical emission spectrometry (ICP-OES).The sol-gel process was successfully applied to produce the glass nanopowders with an amorphous structure. The size of BG nanopowders was measured between 50-180 nm. Both BG nanopowders have no antibacterial effect at broth concentrations less than 12.5 mg/ml. They showed the similar antibacterial effect on E. coli, so their MBC was recorded at 12.5 mg/ml. Cu45SBG nanopowders with MBC of 25 mg/ml were more efficient on S. aureous bacteria than 45SBG nanopowders with the MBC of 50 mg/ml. A little addition of copper to the sol-gel BGs can improve the antibacterial activity especially for the glasses with high amounts of SiO2. It was concluded that Cu45SBG and 45SBG nanopowders with considerable antibacterial activity could be used as a good candidate for maxillofacial reconstruction (Guided tissue regeneration) and root canal disinfection.

Keywords: Bioactive glass Nanopowders,Antibacterial,Minimum Bactericidal Concentration

Synthesis, characterization and antibacterial properties of a novel modified magnetic nanocomposite

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Abstract:

An important difficulty in NPs application is related to with uncontrolled oxidation or irreversible aggregation processes. Stabilization of the magnetic shell is the result of protective coated of nanomaterials and this can be used for the additive functionalization to obtain multifunctional magnetic nanomaterialsfor environmental aims, functionalized NPs finds application as catalytic agents for pollutant degradation. Silica NPs have been done for water cleaning and decreasing the grade of toxic compounds. Functionalized silica colloidal particles developed for in vitro imaging, gene and drug delivery, and antimicrobial applications.

In this study, the magnetic nanoparticles prepared using a co-precipitation method then, the modified silica coated magnetic nanoparticles were synthesized via coating of the prepared nano particles with silica and were covalent grafted with 3-aminopropyl trimethoxysilane to give APTSCMNPs. The reaction of the resulted nanomaterial with dialdehyde afforded DBDA/APTSMNPs nanocomposite material in which the carbon of carbonyl was attached through propyl chain spacer. Resulted nanomaterials were characterized with different techniques such as FT-IR, UV-Vis, NMR, XRD, SEM, TEM, VSM, TGA and AAS.

After that, the antibacterial property of core-shell modified nanocomposite particles was investigated by using a zone inhibition method and bacterial inactivation measurement. Gram-negative Escherichia coli (E. coli) Top 10 strains was used as the model microorganism and it was grown in lysogeny broth (LB) containing tryptone, yeast extract, sodium chloride and distilled water in right proportions. In order to expand the application of present nanocomposites material, antibacterial property also was examined and the results obtained in the present test showed a strong bactericidal effect against E. coli.

Keywords: Antibactrial, Nanocomposite, Escherichia coli

Titanium dioxide nanoparticles toxicity in imported toothpaste

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Abstract:

Nanotechnology has the potential to be used in different ways in the cosmetics sector, creating nano materials with different properties and therefore different risks and benefits. The consumer products inventory lists more than 1600 products that are identified by the manufacturer as containing nanoparticles. As the consumption and synthesis of Titanium dioxide has been increased remarkably in recent years in Iran, in this study we focused on its probably toxicity as Tio2 NPs in 5 imported toothpaste products. Dermal absorption of Tio2 NPs is of interest because many consumer products, such as cosmetics and sunscreens may contain Tio2 NPs. In this study the Tio2 concentration and potential dermal penetration by Tio2 NPs Tio2 have been investigated. We focus on solid phases only and concentrations were determined after chemical digestion by nitric and sulfuric acid digestion followed by inductively coupled plasma optical emission spectrometry. To determine how much Tio2 is in the nanosize range, a separation method have created to separate smaller Tio2 particles from larger Tio2 particles and organic materials. Results demonstrated that 26% of toothpaste samples has Tio2 particles concentration in the scale of <100 nm. Therefore, more environmental ecotoxicology and fate studies should be done.

Keywords: Nanoparticles Toxicity, Tio2, Imported Toothpaste product

Nano-MoO3 as a highly efficient heterogeneous catalyst for a one-pot synthesis of bis(4-hydroxycoumarin) derivatives as antibacterial agents

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Abstract:

4-Hydroxycoumarin derivatives are of interest because of their widespread biological activities. These compounds are used as anticoagulant and sustaining agents. They have also been reported as antibiotics and antitumor drugs. Recently, for the preparation of biscoumarins by the reaction of 4- hydroxycoumarin and various aldehydes (one-pot Knoevenagel condensation and Michael addition), a variety of Lewis acid catalysts, phase transfer catalysts were utilized Our studies have shown that it was easily prepared by the addition of Nano-MoO3 as efficient heterogeneous catalyst for synthesis of bis(4-hydroxycoumarin) derivatives It must be noted that the preparation of nano silica chloride is simple, clean, and without workup procedure. We have now found that reaction between4-hydroxycoumarin with aromatic and heteroaromatic aldehydes using Nano-MoO3 as a catalyst to produce the corresponding bis(4-hydroxycoumarin) derivatives derivatives in moderate to good yields after stirring for a few hours with operational simplicity.

Keywords: 4-Hydroxycoumarin, Nano-MoO3,Antibacterial agents

Co:ZnSoptomagnetic nanoparticles: synthesis and characterization

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Abstract:

Quantum dots (QDs) are nano-sized semiconductor which present unique physicochemical properties and have gained increasing attention in the past decade, because they can be used for optoelectronic and biology application. On the other hand, methods for introducing new magnetic, optical, electronic, photophysical, or photochemical properties to semiconductor are also attracting intense interest. A great deal of attention has been paid to doping bulk semiconductors with magnetic ions such as Mn2+ and Cr2+ which known as diluted magnetic semiconductors (DMSs). In this paper we synthesis Co doped ZnS nanoparticles for inserting magnetic properties to luminescence nanoparticles.

In order to prepare the desired Co:ZnS sample, the solutions would have been carefully controlled. Firstly, the solution of CoCl2 was added dropwisely to zinc solution. After stirring sufficiently, the solution of Na2S was then added into it. The mixture was heated to 75 C and stirred for 30 min. Finally, the precipitates collected with centrifugation were washed by deionized water, and dried at 60C.

The Co:ZnS nanoparticles are characterized by X-ray diffraction illustrating three well defined broad peaks at 2 values of 29.2, 48.5 and 56.9. SEM image of DMSs shows spherical shaped particles with a mean particle size of 60 nm. Photoluminescence analysis shows that the main emission peaks are at about 538 nm, and 595 nm, which are ascribed to existence of interstitial zinc state and vacancy defects, respectively. Furthermore, the magnetization data of optomagnetic nanoparticles indicates hysteresis behavior with the saturation magnetization of 0.022 emu/g and the small value of coercivity (0.2 kOe) signifying soft magnetic behavior of the samples. The observed magnetism is mainly due to the Co ions substitutes in to the ZnS host lattice, which is not resulting from the Co related metal clusters like phases of magnetic (Co2O3 or Co3O4).

Keywords: Optomagnetic, QuantumDot, Diluted Magnetic Semiconductor

Comparison of some mechanical properties of composites reinforced with micro and nanofibers

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Abstract:

In recent decades, more and more composite materials are being considered because of their special properties to use in different industries such as aerospace, military and building industries for increasing the safety. Nowadays, one of the most useful kinds of composites, are fiber reinforced polymeric composites. In this study, affect of variation in fiber diameter as one of the main property of reinforcement has been investigated in tensile strength of reinforced composite. The increasing usage of composites, besides the growing attraction to nanofibers, have led the study to investigate the impact of fiber diameters –ranging from micrometer to nanometer– on the mechanical properties of fiber reinforced composites.

To find the best conditions for producing various webs with different fiber diameter between 100 nanometer to 1.2 micrometer with PAN polymer, the parameters of spinning have been changed in electrospinning process and then tensile properties of webs and reinforced composites have been measured. Considering the ensuing results, it can be concluded that even short value of fibers (between 1.5 – 2%) can improve the properties of reinforced composites. In addition, modulus and tensile strength of webs and composites are decreased by increase in fiber diameters.

Keywords: Fiber Reinforced Composites, FiberDiameter, Tensile Properties

Comparative evaluation of physical properties, resistance, and coatings of silver nanoparticles produced through methods of chemical regeneration by ethanol and Fusariumoxysporum

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Abstract:

Silver nanoparticles are particles with sizes ranging from 1 to 100 nanometers. Due to their unique properties the can be used in molecular diagnostics. They also have applications in several surgical procedures. Different chemical and biological methods have been used to produce silver nanoparticles. This study aims at comparing the size, form, and coatings of the silver nanoparticles produced through chemical versus biological method.

This study investigated and compared the production methods of nanoparticles in terms of sensory probes, optical absorbance at 420 nm, and imaging by transmission electron microscope, and the nanoparticles were evaluated in terms of size, form and coatings.

Observing the maroon color, maximum absorbance at 400 to 450 nm, and electron microscope images approves the existence of nanoparticles, which maintained a round form in both production methods, except for the fact that the biologically produced nanoparticles were smaller and with protein coatings.

Considering the smaller size of nanoparticles and the existence of coatings of the biological compared to the chemical method, which results in their augmented properties and decreased toxicity, authors suggest that the chemical methods be replaced by the biomedical ones.

Keywords: Nanoparticles, Coatings, Toxicity

Removal of phosphate ion from aqueous solution by hydroxyapatite/Fe_3O_4 as an efficient nanosorbent

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Abstract:

Phosphate is the main essential nutrient for growth of organisms. However, excessive release of phosphate in the aquatic ecosystems has been condemned due to the growth of aquatic harmful plants, as well as the depletion of dissolved oxygen. The U.S. Environmental Protection Agency establishes maximum concentration level for phosphorus to be < 20 μg/L in rivers. Several methods have been established for removal of phosphate from water. Nano-structured sorbents provide a promising technique for removing phosphate which would be comparatively useful and cost-effective. This work reports hydroxyapatite/magnetic nanoparticle (HA/Fe3O4) as a sorbent for removal of phosphate. The HA/Fe3O4 was synthesized via precipitation method [1] and the sorbent was characterized using X-ray diffraction and transmission electron microscopy (TEM) techniques. The sorbent was tested towards removal of phosphate ion from aqueous solution. The residual phosphate was also determined via spectrophotometric method after processing the solution with vanadomolybdate as the complexing agent. Three parameters name as pH, incubation time and sorbent concentration were precisely optimized. The results show almost complete removal of phosphate ion from 10 ml solution of phosphate (10 ppm), after contacting with 30 mg of sorbent .The HA/Fe3O4 nanostructures considered as a novel, efficient and promising sorbent in removal of phosphate from aqueous media.

Keywords: Phosphateremoval, Magneticnanoparticle, Hydroxyapatite

Synthesis, characterization and antibacterial activity study of silver nano composites

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Abstract:

Synthesis of silver nano-composites is presented in this paper. The base composition is silicon dioxide. Innovations in the production of these compounds was carried out. These innovations include the type of reducing material and etc. The prepared nano composites were characterization by X-Ray diffraction measurements (XRD), scanning electron microscopy (SEM), and FT-IR. The SiO2 nanoparticles had diameters ranging from 70 to 90 nm; the Ag nanoparticles that formed on the surfaces of the SiO2 nanoparticles had an average size of ca. 15nm. Antibacterial properties is one of the silver nanocomposites properties. And Antibacterial properties was studied.

Keywords: Antibacterial properties, Nanocomposite, Silver

Synthesis and characterization of nanoparticles cadmium sulfateoctahydrat($CdSO_4.8H_2O$)

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Abstract:

Natural inorganic nanomaterials occur through crystal growth in the diverse chemical conditions of the earths crust. Synthetic method for nanomaterials are divided into two main types "Bottom Up" and "Top Down". In this research, top-down method is used. Cadmium sulfateoctahydrat(CdSO4.8H2O) was synthesized by planetary high-energy ball mill. The synthesized nanoparticles were characterized by Fourier Transform infrared spectroscopy (FT-IR) and also size and structure of synthesized nanoparticles were studied by analyzing X-ray diffraction (XRD) and morphology of surface and structure of synthesized nanoparticles were studied by scanning electron microscopy (SEM). Nanocrystalline metallic compounds are said to have enhanced ductility and yield strength as compared to conventional grain-sized materials. The type of mill employed in the mechanical milling process accounts for different milling mechanisms, that is, the way in which the available energy is transferred from the milling media to the material. Developed by Benjamin, mechanical alloying (MA) is an alternative technique for the fabrication of powder particles.

Keywords: Inorganicnanomaterials, TopDown, Ball mill

Synthesis and characterization of ZnO nanoparticles from $[Zn_4O(bdc)_3]$ for Bismarck Brown degradation under room condition

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Abstract:

The Metal–Organic Frameworks (MOFs) typically based on zinc carboxylate structural motifs, represent an interesting subclass of highly porous coordination polymers because of hydrocarbons combined with comparably high chemical inertness and thermally robust behavior, e.g. stability up to 350 ̊ C in air. Thus, porous coordination polymers including MOFs have attracted interest as novel support materials for heterogeneous catalysts. ZnO nanoparticles have recently attracted much attention due to their intensive applications in the industries of chemical and electronical engineering, and materials science. Till now, many methods have been developed to synthesize nano scale zinc oxide including vapor phase growth, sol–gel process, etc.Azo dyes are used for various purposes in textile, paper-making and food industries. A large majority of these dyes are released into the environment. The textile industry produces large quantities of highly colored efﬂuents, which are generally toxic and resistant to destruction by biological treatment methods. Azo dyes, such as Bismarck Brown, are widely used in the textile industry. Various chemical and physical processes, such as chemical precipitation and separation of pollutants,elimination by adsorption on activated carbon , etc. are applied for color removal from textile effluents. One difficulty with these methods is that they are not destructive but only transfer the contamination from one phase to another without destruction or have the other limitations. In this study we prepared metal-organic framework based on benzene-1,4-dicarboxylate by solvothermal method . The structure of metal-organic framework has been confirmed by X-ray diffraction. The porous coordination compound [Zn4O(bdc)3] (bdc =benzene-1,4-dicarboxylate) has been utilized for the preparation of ZnOnano particles by thermal decomposition of the framework at 600◦ C for 2 hours. The structure of ZnOnano particles has been characterized by X-ray diffraction. The morphology and size of nanoparticles were determined by scanning electron microscopy (SEM) images.

Here, we studied catalytic prospect of ZnO nanoparticles on the degradation of Basic Brown. The catalytic activity of ZnO nanoparticles were evaluated by measuring the degradation of Bismarck Brown under mild conditions.

The investigation of nanocopper oxide effect on the broiler chickens blood parameters

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Abstract:

Blood is the main factor of food, oxygen and drug distribution, body temperature and CO2. The uptake of nanoparticles by each type of blood cells,due to their toxicity effects, is very important. The purpose of this study is the investigation of Nano Copper Oxide effect on the broiler chickens blood Parameters of Ross family. This experimental study was conducted on the 60 Ross broiler chickens. Chickens randomly are divided into 3 groups including control, experimental groups 1 and 2. Water and food were given to control group but no particular experimental material was injected or taken. In experimental group 1, 16 mg/kg/bwNano Copper Oxide was taken by chicken for 35 days, orally. In 35th day, blood sample was prepared in order to diagnose the blood parameters adjustment. These studies indicated that WBC, RBC, HGB, MCV and Albumin adjustment average in experimental groups to control group had significant decrease. The main result of this study is that nanoparticles have high toxicity effect on biological and physiological systems.

Keywords: Bloodparameters, Nano Copper Oxide, Ross broiler chicken

Poly-(Alizarin Red S)/MWCNT-modified Glassy Carbon electrode for determination of Buprenorphine in the presence of Ascorbic Acid.

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Abstract:

Drug abuse is a serious health problem in our society. Analysis of drug contents in various biological matrices is necessary in the cases of drug intoxication or suspicion of drug intoxication, drug therapy or in anti-drug control. Buprenorphine (BN) is a strong semi-synthetic opiate painkiller with as sovereignty of 20–40 times higher than that of morphine. Several methods have been reported for the determination of BN including liquid chromatography, gas chromatography mass spectrometry, radioimmunoassay, thin layer chromatography, high performance liquid chromatography-electrospray ionizationtandem mass spectrometry, electromembrane extraction-capillary electrophoresis, and electrochemical methods, especially voltammetry. Among them, electrochemical methods with modified electrodes show some advantages such as extreme simplicity, high sensitivity, easy operation, and low-cost. The modification by electropolymerization with nonconducting polymers results in the thin films growth with high resistivity on the electrode. The growth of such polymers is self-limited and the film that is formed is much thinner than typical conducting polymer films. Because the thickness of non-conducting polymersis only 10–100 nm, electroactive species diffuse rapidly to the including electrode surface [5].

This study aims at the electrochemical characterization of a novel sensor for the electrocatalytic determination of BN. The sensor is based on formation of polymeric film of Alizarin Red S and multi-wall carbon nanotubes on the glassy carbon electrode and used for electrochemical detection of BN in the presence of ascorbic acid. Cyclic voltammetry was used to form electropolymerized film and the redox behavior of ARS was investigated between 0.2 and 1.8 V on a glassy carbon electrode. The comparison of anodic peak currents on the surface of bare GC and modified poly-ARS/MWCNT-GC electrode show significantly improved peak current towards the oxidation of BN.

Keywords: Buprenorphine, Modified Electrode, Carbon Nano Tubes

Magnetic ion imprinted polymer nanoparticles for the preconcentration of Hg(II) ions by using HPLC

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Abstract:

An ion imprinted polymer coated onto magnetite (Fe3O4) nanoparticles (m-MIPs) is shown to be a useful magnetic sorbent for the fairly selective preconcentration by solid-phase extraction of Hg(II). The sorbent was prepared by radical copolymerization of 3-(triethoxysilyl) propyl methacrylate (the monomer), 2-(methacrylamido) ethyl methacrylate (the cross-linker), and the Hg(II) complex of 1-(2-pyridylazo-2-naphthol) in the presence of magnetite nanoparticles. The material was characterized by IR spectroscopy, scanning electron microscopy, and thermal analysis. Following its elution from the column loaded with the m-MIPs with thiourea and HCl, it was submitted to HPLC analysis. The relative standard deviation is ±4.4 %, under optimum conditions, and the limit of detection is 40 ng mL-1. The preconcentration factor of the m-MIPs is 50. The HPLC method shows good recoveries (between 89 and 93 %) from spiked industrial waste water.

Keywords: Hg, Magnetic ion imprinted polymer, nanoparticles

Improvement of Self-Heating Effect by using Non Uniform buried oxide in FinFET Transistor

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Abstract:

Device architectures based on Silicon-On-Insulator technology are candidates for extension of CMOS scaling beyond the limits set for the bulk transistor .These devices can operate in Fully Depleted regime and thus provide reduced short channel effects, leakage current and maintain good scaling capability. Fin field-effect transistors on SOI technology have been recognized as one of the best candidates for nanoscale CMOS devices due to the effective suppression of the short channel effect, higher drive current, improved sub-threshold slope and potential circuit design flexibility. However due to the presence of a buried-oxide (BOX) layer, these devices suffer from self-heating effect (SHE). This is due to the fact that the thermal conductivity of SiO2 is smaller than that of silicon. In addition, use of ultra thin Silicon layer body increases SHE drastically, because of phonon confinement and boundary scattering. SHE affects the carrier mobility and therefore the saturation drive current. As the drain voltage increases, device temperature rises due to the SHE and the channel mobility reduces, thus the drain current decreases in higher drain and gate voltages. In this paper, alternative method was investigated to reduce the SHE by using non uniform shape buried oxide (NU-BOX) in round edge finFET. In this structure the buried oxide thickness under the channel is thinner than other parts of BOX and has been optimized by exploiting trade off between SHE and gate-drain capacitance. Using this structure leads to alleviate the SHE. In addition, the drain-induced barrier lowering effect and off-state current are improved by the NU-BOX FinFETs. For thermal characteristics, the gate bias is 0.9 V and drain bias is 1.4 V in a 30 nm gate length and 40 nm BOX thicknesses under the source and drain and 20nm BOX thicknesses under the channel, thus Maximum lattice temperature is reduced to 309.8 K in our propose structure.

Keywords: Round edge finFET, Non uniform BOX, Self-heating effect

The effect of CNTs on thermal stability and adhesion strength of nano Alumina/epoxy composites

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Abstract:

Nevertheless, polymer nanocomposites have found wide applications in different industries, but problems such as low thermal resistance, has limited the use of these materials. Nanocomposites of inorganic materials / polymer organics especially,those with silicates due to their interesting properties, have gained a special attention the industry. In these nanocomposite, inorganic nanomaterials as the reinforcing layer enterd the polymeric matrix. In this study, the mechanical properties of NanoAlumina/Epoxy nanocomposite containing Carbon nanotubes in their matrix are were studied. the prepared nanocomposites were characterized by SEM and XRD their structure were proved .Also, the effect of variation of the CNT content of the producer nanocomposits on the mechanical properties were studied. Then, the mechanical properties of these nanocomposites containing thermal stability and Adhesion strength will be investigated with TGA and Adhision Tester. In this investigation, various percent of Carbon nanotubes added to NanoAlumina/Epoxy resin mixture and then mechanical properties was studied. Actually In this work, the mechanical properties of the two reaction products 1 and 2 will be Comparison and investigated.

Keywords: Nanoalumina, Carbonnanotubes, Nanocomposite

Ultrasound and precursors affect the crystallinity, morphology, and antibacterial activities of ZnO nanoparticles

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Abstract:

In the present study, ZnO nanoparticles (NPs) as antibacterial agents have been synthesized from two different precursors in the presence and absence of ultrasound. The effect of starting materials and the method of synthesis were investigated on the properties of the ZnO NPs. The crystallographic structures of all samples have been characterized by X-ray diffraction (XRD) and the strength of Zn-O bond for all samples have been determined and compared by mid-infrared (mid-IR) and far-infrared (far-IR) spectroscopy techniques. The morphology of the products has been studied by transmission electron microscopy (TEM). Based on the results, the mechanisms for the growth of ZnO NPs have been proposed for the samples prepared under different conditions. The antimicrobial activity of the resultant powders toward Escherichia coli as a model of microbe has been evaluated by absorption and colony count methods in the form of nanofluid.

Keywords: Sono-synthesis, ZnOnanoparticles, Antibacterial activity

Separation of sunset yellow food dye in snack by modified nanosorbent before determination with spectrophotometry

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Abstract:

Nanosorbent which has cationic surfactant cetyltrimethylammonium bromide (CTAB) coating treatment as the sorbent could be an easy and useful method to extract and make a pre-concentrated in detecting the sunset yellow food dye before they are determined via the spectrophotometry (UV-Vis). In this procedure, the nanosorbent which are developed in this plan have the potential of distribution in the aqueous samples. By using a Brunauer-Emmett-Teller (BET), Barrett-Joyner-Halenda (BJH) and X-ray diffraction (XRD), the specifications and characteristics of the sorbents are easily noticed. The influences of the experimental parameters such as the pH of the sample, the type and concentration of the eluent, surfactant concentration and volume, amount of sorbent and the interactions of ions with respect to the sunset yellow detection have been studied. The calibration graph was linear in the range of 20-800 ng ml-1 with detection limit of 8.2 ng ml-1. Relative standard deviation (RSD) for 6 replicate measurements was 3.8%. This method of detection has been applied to the determination of sunset yellow at levels in real samples such as Snack with satisfactory results.

Keywords: Nanosorbent, Sunsetyellow, Snack

Iron oxide nanoparticle effects on the oxidative stress induced by isoniazid

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Abstract:

According to the increased use of nanomaterials in industrial productions, especially iron oxide nanoparticles and given them as a hope to diagnose and treat many of the human diseases, it is essential to investigate their effects on basic tissues of human body with their unique features. The aim of this study is to investigate iron oxide nanoparticles effects on hemolytic and oxidative stress arising from isoniazid drug. This study is experimental which was done on 45 mice selected by random. Animals were administered by 50mg/kg oral isoniazid with a gavage syringe. Iron oxide nanoparticle was injected intraperitoneal and in 13 consecutive days. After 24 hours, nanoparticle was injected with a combination of 50mg/kg isoniazid. After 24 hours blood samples were used as various parameters for investigation of their anti-hemolytic roles. The measured parameters in this study includes: hematocrit, hemoglobin, red blood cells, fragility of red blood cells. in this study increase in hemoglobin of the blood, hematocrit and red blood cells were observed in the groups administered by nanoparticles and had meaningful decrease in isoniazid group. The results show that Isoniazid induced lipid peroxidation and hemolysis. However, iron oxide nanoparticles can prevent these side effects induced by isoniazid

Keywords: Iron oxide Nanoparticle, Isoniazid, Hemolysis

Nanoprecipitated calcium carbonate as TiO_2extender in acrylic emulsion paint

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Abstract:

Matt emulsion paints require relatively high levels of TiO2 pigment to obtain adequate opacity. Kaolin and ultrafine calcium carbonate (CaCO3) are such extenders which improve the "spacing" of TiO2 particles to optimize the light scattering efficiency and enabling a significant saving in the amount of TiO2 in paint. This paper examines the usage of calcium carbonate nano Fibers forming a highly porous micro shell structure as TiO2 Extender in Acrylic Emulsion Paint. The samples were formulated at different calcium carbonate/ TiO2 ratios with similar PVCs and viscosities. The properties of formulations such as hiding power, contrast ratio, color coordinates, reflectance, gloss and scrub resistance were investigated to find the optimum percent of TiO2 replacement. The morphology of NPCC and its distribution in the formulation was identified by scanning electron microscopy. The scattering ability of NPCCs enhances the reflectance and contrast ratio in the optimum formulations. In addition, NPCC formulations provide good scrub resistance. Other performance properties up are also addressed. It was demonstrated that using NPCC allows a saving of over 10% in the TiO2 content of the paint, without loss in opacity or other properties and about 7% of the pigmentation cost.

Keywords: Paint, Nano calcium carbonate,TiO2 extender

Immobilization of bacteriorhodopsin monolayer on polycarbonate by using Langmuir Blodgett

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Abstract:

The key role of proteins in medical and bioanalytical fields is obvious to everyone. Immobilization of proteins on solid surfaces with the correct orientation has caused development and progress in various fields such as biotechnology and bio-sensor and protein in microarraies. In this study an attempt is made to create a covalan and self-cumulative electrostatic bind in order to stabilize the bacteriorhodopsinproteinonpolycarbonate (CDwithoutgrooves) on a single layer. When bacteriorhodopsin is consolidated on a single layer, it has a very high stability and it can register information; thus, this information will be permanently stored in bacteriorhodopsin itself. Polycarbonate surface, in this study, was modified by the use of gold nanoparticles and Acid which leads to the formation offunctional groups on the surface of polycarbonate. To determine the placement offunctional groups and immobilized proteins on the surface, ATR- FTIR and Raman were applied. And after making bacteriorhodopsinmonolayered by the use of Longmuir Blodgett along with SEM and AFM the results were examined. Longmuir device uses dipping technic. In this study the single layer bacteriorodobsin is stabilized appropriately on polycarbonate, and has a propitious biological function. This function has been analyzed by layzer (Red and Green) irradiation. Bactetiorodobsine biological function was also considered in the presence of light, and the results suggested that the protein had proper functions.

Keywords: Bacteriorhodopsin, LangmuirBlodgett, Polycarbonate

Electrochemical investigation of catechol at gold nanoparticles – graphene oxide modified glassy carbon electrode

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Abstract:

Phenolic compounds are broadly used in the manufacture of products, including coal conversion, petroleum refining, pharmaceuticals, surfactants, resins, and plastics and thus readily release into the ground and surface water. The identification and quantification of them are important for environmental monitoring because many of them are toxic contaminants and have harmful effects on plants, animals and human health. Many analytical methods are available for the determination of them, such as capillary electrophoresis, high performance liquid chromatography. These methods are very expensive and time-consuming. This then prompted the development of different types of sensors for detecting of phenolic compounds. Gold nanoparticles (AuNPs) have good conductivity and strong adsorption ability. AuNPs are usually used in many sensors. A method was designed to construct an electrochemical sensor for detection of phenolic compounds based on electrodeposition of AuNPs onto a glassy carbon electrode (GCE) that was modified with graphene oxide (GO). First, we dropped 5 µL of graphene oxide solution onto the surface of GCE. After drying, it was modified with AuNPs using electrodeposition technique at constant potential of -0.40V during 300 seconds. Then modified electrode was characterized with Atomic force microscopy (AFM) and electrochemical techniques. Cyclic voltammetry (CV) was employed to study the electrochemical behaviors of catechol at the modified electrode. The oxidation and reduction peak potentials of cyclic voltammetry technique showed shifts in the presence of catechol indicating that the electron transfer between the electrode and bulk solution of catechol was facilitated. In pHs from 2 to 9, pH 6 was the optimum pH for investigating of electrochemical behavior of catechol. AFM shown that the layer of AuNPs/GO/GCE has nanometric size.

Keywords: Phenoliccompound, Goldnanoparticles, Graphene oxide

Examination of electrochemical behavior of cortisol at modified gold electrode

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Abstract:

Cortisol, also known more formally as hydrocortisone, is a steroid hormone, more specifically a glucocorticoid, produced by the zone fasciculate of the adrenal gland. It is released in response to stress and a low level of blood glucocorticoids. The main reason to measure cortisol is to diagnose human diseases characterized by deficiency of adrenal steroid excretion in Addison's disease or overproduction in Cushing's syndrome. In both cases a sensitive, accurate and reproducible assay of cortisol is needed. In this study, we constructed the N-phenylaza-15-Crown 5-Ether (NC) Capped- Butanethiol monolayer-protected gold nanoparticles modified with 11-mercapto-undecanoic acid (11-C4MPN) /L-cysteine/AuNPs/poly pyrrole/Au electrode and used it for investigating of Cortisol concentration in human blood serum sample. For modifying of gold electrode, we added poly pyrrole solution, which it contained gold nanoparticles, on the surface of the gold electrode, then we placed this electrode in L-cysteine solution (0.5 M) for 24 hours and after that it was rinsed with distilled water. Then we placed the electrode in electrochemical cell for scanning of potential from -1.5 to 1.5 for immobilizing of L-cysteine onto the electrode surface. Then we placed the electrode in solution containing N-phenylaza-15-Crown 5-Ether (NC) Capped- Butanethiol monolayer-protected gold nanoparticles modified with 11-mercapto-undecanoic acid (11-C4MPN) and rotating the electrode with 800 rpm (revolution per minute) speed for 5 hours. We used scanning electron microscopy technique for investigating of the electrode surface. We also used cyclic voltammetry and square wave voltammetry for investigating of sensor in different conditions such as pH and for obtaining limit of detection and linear range. The limit of detection and linear range for cortisol were obtained 0.003 nM and 0.06-100 nM, respectively. The proposed biosensor shown many advantages such as good sensitivity, selectivity and stability.

Keywords: Cortisol, Goldnanoparticle, Electrochemical detection

Silver nanoparticles coated polyethersulfonemicrofiltration membranes with anti-biofoulingefficiency

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Abstract:

Biofouling due to the accumulation and growth of microorganisms on the membrane surface is a critical issue in some membrane processes. Using of membranes with antimicrobial activity is a solution to reduce the biofouling phenomenon. In this work, polyethersulfone (PES) microfiltration membranes with antifouling property were prepared by coating silver nanoparticles on the membrane surface in order to reduce the biofouling in the milk filtration. For this purpose, the polyethersulfone microfiltration membrane was prepared by vapor induced phase inversion coupled with non-solvent induced phase inversion method. Then the membrane was immersed in a stable and uniform colloidal solution of silver nanoparticles that was synthesized by chemical reduction of silver salt using fructose as an environmentally friendly reducing agent. The membrane pore size and fluxes was measured by the water permeability tests. The antifouling effect of silver coated membranes was investigated by the microfiltration of milk in the cross flow mode. The protein content of permeate and retentate streams of the milk filtration as well as the feed protein content were measured by Formol method. The results showed that the protein permeability of the silver coated membranes is higher than uncoated membrane. Also, it was observed that the steady state milk permeation flux of the coated PES membrane was higher than that of uncoated membrane while the membrane pore size decreased after nano silver coating. These behaviors can be related to the anti-biofouling property of the silver nanoparticles on the membrane surface.

Keywords: Silver nanoparticles, Polyethersulfonemembrane, Biofouling

PreconcentrationCarmoiseine food dye in cake and snack by modified nanosorbent before determination with spectrophotometry

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Abstract:

In this study, preconcentration, separation and determination of trace amounts of Carmoiseine food dye in Cake and snack samples were taken. A new sorbent used for sepration and preconcentration of Carmoiseine. It was prepared by immobilization of surfactant cetyltrimethylammonium bromide (CTAB) on nanosorbent SBA-15. In order to investigate the amounts of effective and size surface, modified nanosorbent, was used by techniques Brunauer-Emmett-Teller (BET), Barrett-Joyner-Halenda (BJH) and X-ray diffraction (XRD). The effective factors such as pH, amount of adsorbent, contact time, eluent concentration and solvent recovery volume for quantitative determination of Carmoiseine were optimized. Figures of merit such as precision, accuracy,limit of detection and enrichment factor was obtained with good results. The linear range of the calibration graph for Carmoiseine is between 10-700 ng ml-1 and the detection limit was 4.1. Relative standard deviation (RSD) of Carmoiseine was 2.8%. This method of detection has been applied to the determination of Carmoiseine at levels in food samples such as Cake and Snack with satisfactory results.

Keywords: Carmoiseine, Cake and Snack, Nanosorbent

Study of the interaction between bovine serum albumin and 2%Mn doped ZnSquantum dot

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Abstract:

Semiconductor nanoparticles (quantum dots) are promising fluorescent markers, but it is very little known about interaction of quantum dots with biological molecules. In this study, interactions of 2% Mn Doped ZnS quantum dots with human serum albumin (HSA) were studied by fluorescence and UV–Vis spectroscopic techniques. It was observed that fluorescence of HSA was strongly quenched by ZnS QD. By analysis of the quenching rate constant kq, the relationship between KSV and temperature, and UV–vis absorption spectra, the quenching mechanism was discussed to be a static quenching procedure resulted from formation of QD–HSA complex. According to the modified Stern-Volmer equations at different temperatures, the thermodynamic parameters, ΔH0, ΔS0 and ΔG0 were determined. Based on the sign and magnitude of the enthalpy and entropy changes (ΔH0 = -38.87 kJ mol-1 and ΔS0 = -42.75 J mol-1 K-1), hydrogen bond and van der Waals forces were suggested as the main interacting forces.

Keywords: Human serum albumin, ZnS quantum dots, Fluorescence Quenching

The effect of main parameters on the radiative properties of different nanoantennas under the non-dissipative conditions

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Abstract:

Because nanoantennas have larger conductivity than normal antennas, using these kinds of antenna is very important. But in nanoantennas due to very small diameter and thickness, there is a big resistance. So studying the theory and predicting the performance of nanotube antenna is significant. In this paper, the quantities that are used to describe Nano antenna such as kinetic inductance and quantum capacitance are calculated theoretically. In order to get to this aim at first we describe the circuit model that is used in our calculations. Then current distribution for this model is computed. By specifying current distribution we are able to calculate electrical and magnetic fields on nanoantenna in the far distance from the antenna. Then by using these fields we can calculate the properties of these nano antennas such as poyinting vector, total radiative resistance, total power and direction under non-dissipative condition. Finally, all the calculations are repeated for Aluminum, Copper, Carbon and gold-silver nanotube in order to introduce the best kind of nanotube to make nanoantenna.

Keywords: Nanoantenna, Radiation, Dissipative

Safety improvement of organic dyes using polymeric nanocapsules

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Abstract:

Organic dyes have gained extensive interests because of their potential applications in medical science, optical elements and photonics devices; but because of safety reasons and cancer suspect existence for many dye molecules, use of these organic materials in some applications such as in-vivo studies is unprofitable. Among various organic dyes, Disperse Red-1 (DR1) has attracted the most attention because it has a simple structure and used for both photoisomerization and rotational process in optical devices. Up to present, although many studies did on this dye, but because this insoluble water dye solves in some volatile and toxic solvents such as dichloromethane, its properties in liquid phase remains unstudied.

By confining the DR1 molecules into hydrophobic core of the polymeric nanocapsules and then disperse this nanoparticles in distilled water, the encapsulated dyes becomes useable in liquid phase needed optical elements such as Kerr cells and also encapsulation of dyes improves their safety and even useable in case of in-vivo medical applications. In this work, the polymeric nanocapsules with narrow size distribution are prepared by using water insoluble DR1 organic dye along with the suitable surfactants using phase-separation method. Many factors such as amount of polymer, surfactant type, dropping rate of phase separation agent, disperse dye concentration in dispersion, and dispersing time in this method, could greatly influence on the particle size and morphology of the encapsulated disperse dye.

The average size of the polymeric nanocapsules obtained from DLS, was 132 nm and TEM results confirm the encapsulated structures of the dyes inside of polymeric shell. The polymeric nanocapsules show the good stability when dispersed in distilled water. Using dialysis method, confirms that organic dye molecules capsulated inside the core of polymeric nanocapsules and safety improvement of these molecules was achieved.

Keywords: OrganicDye, PolymericNanocapsules, Safety Improvement

Surface coating of synthesized zirconium nanoparticles to develop safety against self-ignite

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Abstract:

Zirconium metallic nanoparticles are very active and ignite intensely when exposed to air. One of the ways to prevent it, is the coating on the surface of the nanoparticles. In this research, zirconium nanoparticles were synthesized by metallothermal. In this method, reaction of commercial ZrO2 with Mg powder was carried out in a closed stainless steel cell under Nitrogen inert gas, at 750 °C for 2 hours. On completion of the reaction, the additionally formed MgO is removed by treatment with acid. Product was mixed with Viton as coating material/agent, since Viton is easily dissolved in acetone. Size and morphology of the nanoparticles synthesized were investigated by Scanning Electron Microscopy (SEM), while the purity of the product was determined by X-ray Diffraction. Effects of the Viton concentration on measurable area of the static electric sensitivity were investigated by Electrostatic Discharge Sensitivity test (EDS). Pure zirconium nanoparticles with an average size of about 20 with a spherical morphology were obtained. Increasing concentrations of Viton causes static sensitivity reduced.

Keywords: Zirconium, Self-ignite, Static sensitivity

Functionalization of multi-walled carbon nanotube by different concentrations of H2SO4/HNO3 solution

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Abstract:

Wet chemical oxidation is known as an efficient method for carbon nanotubes purification and promoting dispersion. Oxygen containing functional groups (OH, C=O, and COOH) attached on the carbon nanotubes surface through liquid-phase oxidation are found to responsible for the various physicochemical and catalytic properties of the matter. It is known that the amount and type of oxygen containing functional groups depends on the oxidants concentration. In present study, the effect of oxidants concentration in H2SO4/HNO3 (3:1 v/v) solution was investigated on generating functional groups on the surface of multi-walled carbon nanotubes (MWCNTs). The concentrated sulfuric acid and nitric acid and a diluted mixture of them (8M H2SO4/ 0.3M HNO3 (3:1 v/v)) were used for functionalization of MWCNTs. Scanning Electron Microscopy (SEM) showed structural damage after oxidation. Laser Particle Size Analyzer (LPSA) demonstrated that diluted acidic mixture has low effect on particle sizes but small particle sizes can be seen in MWCNTs oxidized with concentrated acidic solution. The presence of more carboxylic groups on the oxidized MWCNTs with concentrated acidic solution was proved by Fourier Transform Infrared spectroscopy (FT-IR) and acid-base titration. Stability of functionalized MWCNTs suspension was investigated with dispersing in deionized water and Methanol. The suspension of oxidized MWCNTs with concentrated H2SO4/HNO3 (3:1 v/v) was stable up to one month but MWCNTs oxidized with diluted H2SO4/HNO3 were deposited in deionized water and Methanol as dispersed.

Keywords: Carbonnanotubes, Chemicaloxidation, Carboxylic groups

Nano Energy Session

Fossil fuels are the main energy supply today causing air pollution and global warming. These sources of energy are irreversibly declining. On the other hand, the world is consuming an ever-increasing amount of energy due to population growth and improvement in human development globally. Therefore, the search for alternative **clean energy** such as solar is becoming more important every day. Nanotechnology as an evolutionary science and multidisciplinary field provides the potential to enhance energy efficiency across all branches of industry and could positively affect the society.

Knowing the importance of energy problems to sustainable development, the **International Conference on Nano Energy** is intended to create an open space networking, exchange of knowledge and collaboration between professionals in the academic, research and industrial communities as well as young researchers and graduate students. The conference will be held from **8 to 11 March 2015, in Kish Island, Iran**. It covers wide variety of topics, including energy production, storage, transmission, conversion, distribution and consumption as well energy optimization processes. The scientific program will feature plenary and invited presentation, contributed oral and poster presentations.

The beautiful Kish Island is a free zone and is located in the South of Iran in the Persian Gulf. It is peaceful, relaxing and pleasure during the March and **no visa is needed** for staying up to 14 days.

On behalf of all the organizers, we look forward to meeting you in Kish Island, Iran.

A.Z. Moshfegh, Conference Chair
Professor of Physics,
Sharif University of Technology

Masakazu Anpo, Conference Co-Chair
Professor, Graduated School of Engineering
Osaka Prefecture University