In The Name of God

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Pharmaceutical Sciences Branch

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Journal of Pharmaceutical & Health Sciences

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Journal of Pharmaceutical & Health Sciences

Aims & Scopes

Journal of Pharmaceutical & Health Sciences is the official journal of the Pharmaceutical Sciences Branch, Islamic Azad University (IAUPS), Tehran, Iran. This peer-reviewed and multi-disciplinary journal publishes research reports, editorials and review articles on all aspects of the pharmaceutical sciences and health with strong emphasis on originality and scientific quality. The editors welcome articles in multidisciplinary expertise, ranging from

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- *toxicology*
- *traditional medicine*

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Centers for Disease Control and Prevention. Strongyloidiasis. www.dpd.cdc.gov/dpdx/HTML/Strongyloidiasis.htm (accessed 2007 Aug 17).

ABSTRACT
Rao N, Knebel W, Bergsma T. Population pharmacokinetics of istradefylline (abstract 13). J Clin Pharmacol 2007; 47:1185.

JOURNAL SUPPLEMENT
Ries AL, Bauldoff GS, Carlin BW, et al. Pulmonary rehabilitation executive summary: Joint American College of Chest Physicians/American Association of Cardiovascular and Pulmonary Rehabilitation Evidence-Based Clinical Practice Guidelines. Chest 2007; 131(suppl):1S-3S. DOI 10.1378/chest.07-0892

JOURNAL OR MAGAZINE PAGINATED BY ISSUE
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Shah M, Cunningham MJ. Toxicogenomics. In: Gad SC, ed. Handbook of pharmaceutical biotechnology. 1st ed. Hoboken, NJ: John Wiley & Sons, Inc., 2007:229-51.

PACKAGE INSERTS
Product information. Zantac (ranitidine). Research Triangle Park, NC: GlaxoSmithKline, June 2007.

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Davis TM, Yeap B, Bruce DG, Davis WA. Lipid-lowering therapy protects against peripheral sensory neuropathy in type 2 diabetes. Presented at: 67th Scientific Sessions. American Diabetes Association Annual Meeting, Chicago, IL, June 22, 2007.

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Part II NanoSafety sessions

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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 nanoparticlesdetermined 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

JPHS

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 electroactivenano-materials (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

JPHS

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

JPHS

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. AfterThe 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 a ability to produce silver nanoparticles.

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

JPHS

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 reveal that zinc oxide nanoparticles has 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

JPHS

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

JPHS

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

JPHS

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 sphericalnanostructure 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

JPHS

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

JPHS

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

JPHS

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

JPHS

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

JPHS

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

JPHS

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 it,s 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

JPHS

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

JPHS

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

JPHS

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

JPHS

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

JPHS

Removal of phosphate ion from aqueous solution by hydroxyapatite/ Fe3O4 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

JPHS

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: Antibacterialproperties,Nanocomposite,Silver

JPHS

Synthesis and characterization of nanoparticles cadmium sulfateoctahydrat(CdSO4.8H2O)

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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

JPHS

Synthesis and characterization of ZnO nanoparticles from [Zn4O(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.

JPHS

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

JPHS

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, specially 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

JPHS

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

JPHS

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

JPHS

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 the 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

JPHS

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

JPHS

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

JPHS

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 were 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

JPHS

Nanoprecipitated calcium carbonate as TiO2extender 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

JPHS

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 obviousto everyone. Immobilization of proteinsonsolid surfaceswiththe correct orientationhascaused developmentand progress invarious fields such asbiotechnologyandbio-sensor andprotein in microarraies.In thisstudyan attempt is made tocreate a covalan and self-cumulativeelectrostatic bind in order to stabilize thebacteriorhodopsinproteinonpolycarbonate(CDwithoutgrooves) ona single layer.Whenbacteriorhodopsin isconsolidatedona single layer, it has a veryhighstabilityand it canregister information; thus,this information will be permanentlystored in bacteriorhodopsin itself.Polycarbonatesurface, in this study, was modified by the use ofgold nanoparticles and Acid which leadsto the formation offunctional groupsonthesurface ofpolycarbonate. Todeterminethe placement offunctional groupsandimmobilizedproteins on the surface,ATR- FTIR and Raman were applied. And after making bacteriorhodopsinmonolayeredby the use of Longmuir Blodgett along with SEM and AFM the results were examined. Longmuir device uses dipping technic.In this studythe singlelayerbacteriorodobsin is stabilized appropriately onpolycarbonate, and has a propitious biological function. This function has been analyzed by layzer (Red and Green) irradiation.Bactetiorodobsine biological functionwas also consideredin the presence of light, and the resultssuggested thattheproteinhad properfunctions.

Keywords: Bacteriorhodopsin,LangmuirBlodgett,Polycarbonate

JPHS

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

JPHS

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

JPHS

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

JPHS

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

JPHS

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

JPHS

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

JPHS

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

JPHS

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

JPHS

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

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