Annals of Advances in Chemistry

Volume - 6, Issue - 1

Research Article **Published Date:- 2022-12-30**

Au26-35: A Special Geometrical Structure of Au33 (D2) Cluster with Highly Occupied - 14 Pairs of Double-State Degeneracy

In this article, an interesting phenomenon has described the geometries and vibrational frequency of the stable AuN clusters with N = 26 to 35. We have found nine out of ten clusters are having the very same C1 symmetry, except the cluster N = 33 (D2). The finite-differentiation method has been implemented within the density-functional tight-binding (DFTB) approach. The effects of the range of interatomic forces were calculated and the desired set of system eigenfrequencies (3N-6) are obtained by diagonalization of the symmetric positive semidefinite Hessian matrix. Mainly, we have observed the vibrational spectra and the range comes in between 2.04 and 347.32 cm?1 at ground state, ?E = 0. Most significantly, all the clusters have revealed double-state degeneracy. The vibrational spectrum is strongly dependent upon the size, shape, and structure, at the same time, the stretching and the bending mode of the atoms with respect to the bond length plays a major role. We have compared some of our results, which have an excellent agreement, with the less availability of the experimental and the theoretical predictions.

Research Article **Published Date:- 2022-12-20**

Optimization of the fermentation process, characterization and antioxidant activity of exopolysaccharides produced from Azotobacter As101

Azotobacter was selectively isolated and purified from the soil samples of Xinjiang Salt Lake Scenic spot, the fermentation technology of exopolysaccharides (EPS) by Azotobacter was optimized, and the antioxidant activity of exopolysaccharides (EPS) was studied. The bacteria were isolated and purified from the soil samples by the scribing method and the 16SrRNA gene was used for molecular identification. The carbon source, fermentation time, inoculation amount and pH of target bacteria in the exopolysaccharides (EPS) fermentation process were optimized through single-factor experiments and their antioxidant activity was measured. Eight types of Azotobacter were isolated and purified from the soil samples of Salt Lake scenic spot. Among them, As101, which showed 99.58% homology with Azotobacter salinestris, was selected as the target strain. Through single-factor experiments which used exopolysaccharides (EPS) yield and exopolysaccharides content as indexes, the optimal conditions for the As101 fermentation process were determined as follows: fermentation temperature 35, fermentation time 96h, pH 7 and mannitol as carbon source. Exopolysaccharides content from Azotobacter salinestris was 61.35% and the yield was 6.34 g/L. The results of the exopolysaccharides (EPS) antioxidant activity experiment under optimal conditions showed that As101 EPS had excellent scavenging ability against DPPH free radical, ABTS free radical and hydroxyl free radical, with IC50 values of 6.11 mg/ml, 2.42 mg/ml and 9.57 mg/ml, respectively. As101 with high yield and high exopolysaccharides content was isolated from saline soil in a special environment of Xinjiang, and the EPS obtained showed excellent antioxidant activity. The Azotobacter found in this study would provide the material basis for further opening up the adsorption of exopolysaccharides on heavy metals and the improvement of saline-alkali soil and contribute to further understanding of the structure and other activities of exopolysaccharides derived from Azotobacter.

Research Article **Published Date:- 2022-11-01**

Interface of polymers grafted on silica: Organization of the interfacial layer in presence and absence of solvent

The 1H NMR technique is used to study the behaviour of the poly (ethylene oxide) (PEO) chains grafted chemically on silica in the presence or not of solvent. A noticeable influence of the different physicochemical parameters on the conformation of the grafted macromolecules is evinced. Different models are proposed for different lengths of grafted polymer chains on the surface in the absence and presence of a solvent. Without solvent, the macromolecules lie very flat and the layer is more organized. In the presence of a solvent, the chains spread out and adopt a more extended conformation and the local concentration of monomers decreases.

Research Article **Published Date:- 2022-10-31**

Neutrophil and platelet lymphocyte ratio in diabetes mellitus

Background: This study, it was aimed to investigate the relationship between Neutrophil Lymphocyte Ratio (NLR) and Platelet Lymphocyte Ratio (PLR) in Type II Diabetes Mellitus (Type II DM) patients.
Methods: The data of the study were obtained from 108 patients, 61 women and 47 men, who were diagnosed with Type II DM, who applied to the Diabetes Polyclinics of Training and Research Hospital between 01.01.2020 and 30.06.2020 and a healthy control group without Type II DM. The data of the patients were obtained retrospectively via the Hospital Information Management System (HIMS).
Results: The mean age of the Type II DM patient meeting the study criteria were 57.9 ± 12.69 years. The mean age of the control group was determined as 55.8 ± 8.81. There was no significant difference between the patient and control groups in terms of age and gender. The NLR of type II DM patients was 2.96 ± 1.15 and that of the control group was 1.91 ± 0.81. The PLR of type II DM patients was found as 179.29 ± 61.81 and the PLR of the control group was found as 121.21 ± 51.33. When NLR and PLR values of type II DM patients and the control group were compared found that it was statistically significant ($p < 0.05$).
Conclusion: Although more analysis is needed to prove that NLR and PLR are associated with type II DM disease, our study's high NLR and PLR values in Type II DM patients should suggest that these parameters are essential in the diagnosis and follow-up. Also, NLR and PLR inflammatory diseases, acute coronary syndrome, rheumatoid arthritis, etc., is higher, suggesting that this is related to unsanitary conditions rather than a specific disease.

Research Article **Published Date:- 2022-09-13**

Synthesis of citric acid using novel Aspergillus niveus obtained from agricultural wastes

Fungus belonging to the genus Aspergillus is considered highly important in the production of various types of enzymes and organic acids. Aspergillus species produce organic acids such as citric acid, itaconic acid, and malic acid, which are one of the most important alternate techniques for chemical processes. Citric acid is an important component in the manufacturing process of food and beverages, pharmaceuticals, cosmetics, toiletries, detergents, and other industries. In this work, A.niveus was isolated from the agricultural waste collected in Kotagiri, The Nilgiris, India. Submerged batch fermentation with a range of low-cost substrates, such as wheat flour, corn starch, and sweet potato, was used to successfully synthesize citric acid by the isolated fungus. In addition, production-related factors such as substrate concentration and incubation time were optimized. The maximum yield of citric acid was produced using A. niveus from corn starch at a concentration 7of 120 g/L after 168 hours at pH 3.2. Furthermore, with a degree of extraction of 91.96, citric acid was extracted from fermentation.

Review Article **Published Date:- 2022-09-08**

Electrochemical promotion of catalysis

The Electrochemical Promotion of Catalysis (EPOC) or Non-Faradaic Electrochemical Promotion of Catalysis (NEMCA effect) is a phenomenon observed as a reversible change in catalytic rate (i.e. no net charge transfer rate) of a chemical reaction occurring on a catalyst film (or supported dispersed catalyst) deposited on an ionically conducting or mixed electronically-ionically conducting solid electrolyte support upon the application of an electrical potential between the catalyst and a second conductive film deposited on the solid electrolyte support.

Research Article **Published Date:- 2022-09-02**

Fabrication of novel Co3O4@GO/La2O3 nanocomposites as efficient, innovative and recyclable nanocatalysts for the synthesis of quinazolinone derivatives under solvent-free conditions

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For the first time, this research has developed an efficient and novel approach to high to excellent yields for synthesizing Quinazolinone derivatives. Also, the synthesis of Quinazolinone derivatives has been carried out in the presence of Co3O4@GO/La2O3 nanocomposite as a novel heterogeneous catalyst and a green under solvent-free conditions and in a short time and excellent yields for the first time. Various structural and morphological characteristics of the nanocatalyst were employed for the catalyst characterization, such as FT-IR, XRD, FE-SEM, EDX and VSM analyses. All characterization data were checked with each other so that the structure of the nanocatalyst was exactly characterized. The reactions were carried out in the presence of a low amount of nanocatalyst at 100 °C under solvent-free conditions for a short period of time. The proposed nanocomposite exhibits excellent catalytic activity. One of the most important advantages of this method is easy magnetic nanocatalyst separation, green condition, excellent recoverability and easy workup.

Research Article **Published Date:- 2022-08-26**

Viscosity-sensitive mitochondrial fluorescent probes and their bio-applications

As a vital index of the mitochondrial micro-environment, mitochondrial micro-viscosity plays a fundamental role in cell life activities. Normal mitochondrial viscosity is a necessary condition for the maintenance of normal life activities of mitochondria. Abnormal mitochondrial viscosity can lead to a series of mitochondria-related diseases. Therefore, it is essential to observe mitochondrial viscosity for physiological and pathological processes. Given the conventional viscosity measurement methods (viscometer, etc.) cannot monitor the changes in mitochondrial viscosity, the fluorescence method supplemented with the fluorescent probe is widely used to observe the changes in mitochondrial viscosity. In view of the booming development in this area, this review describes the applications of viscosity-responsive mitochondrial fluorescent probes in biological samples from the cellular and tissue levels. We hope that this review will deepen our understanding of mitochondrial viscosity and related fields, and promote the development of viscosity-sensitive mitochondrial probes and other organelle fluorescence probes.

Review Article **Published Date:- 2022-08-11**

Bio-inspired fabrication of zinc oxide nanoparticles: Insight into biomedical applications

Nanotechnology is starting the characterization, fabrication, and possible applications of numerous materials at the Nano-scale. Over the last few eras, nanomaterials provide a platform for researchers from diverse arenas due to the high surface-to-volume ratio and other novels, and new significant belongings. Zinc oxide nanoparticles are receiving diverse biomedical applications because of their distinctive antimicrobial, antioxidant, anticancer, antifungal, antileishmanial, anti-larvicidal, wound healing, anticholinergic, and anti-diabetic properties. Different physical and chemical approaches have been used to synthesize zinc oxide nanoparticles, but these methods cause ecotoxicity and are time-consuming and costly. Therefore, there is a need for more eco-friendly, cost-effective, and safe methods. Such biogenic Zinc oxide nanoparticles offer more advantages over other physiochemically synthesized methods. In this review, we have summarized the recent literature for the understanding of the green synthesis of Zinc oxide nanoparticles, their characterization, and their various biomedical applications.

Mini Review **Published Date:- 2022-07-27**

A reaction and movement of vacancy and solute atom in metals under elastic tensile stress

In the 17th century, Robert Hooke, an English physicist, proposed Hooke’s law. Since then, the theory of elastic deformation in metals has been restricted to a macroscopic frame that is normalized by Hooke’s law. From the start of the 21st century, Xu has established a microscopic theory of elastic deformation based on Hooke’s law to describe the reaction and movement of vacancy and solute atom in metals under elastic tensile stress [1,2].

Short Review **Published Date:- 2022-06-20**

High-Performance Liquid Chromatography (HPLC): A review

Today HPLC is widely applied for separations and purifications in a variety of areas including pharmaceuticals, biotechnology, environmental, polymer and food industries. It is accomplished by injection of a small amount of liquid sample into a moving stream of liquid (called the mobile phase) that passes through a column packed with particles of the stationary phase. The separation of a mixture into its components depends on different degrees of retention of each component in the column. HPLC is just one type of liquid chromatography, meaning the mobile phase is a liquid. Reversed-phase HPLC is the most common type of HPLC. The reversed-phase means the mobile phase is relatively polar, and the stationary phase is relatively non-polar. HPLC instrumentation includes a Solvent reservoir, pump, injector, column, detector, and integrator or acquisition and display system. The heart of the system is the column where separation occurs. The information that can be obtained using HPLC includes identification, quantification, and resolution of a compound. The major applications are in the area of Pharmaceuticals, food, research, manufacturing, forensics, and bio-monitoring of pollutants.

Research Article **Published Date:- 2022-06-08**

Treatment of antibiotic-resistant bacteria by nanoparticles: Current approaches and prospects

Antibiotic-resistant bacteria are emerging pathogens whose resistance profiles generate a serious health crisis by holding their impact on human health. Misuse of antibiotics has directed the emergence of microbes immune to presently accessible drugs. Pathogenic bacteria become resistant by employing various mechanisms, such as; antibiotic modification, target site alteration, and biofilm formation, increasing the time they spend in the intracellular environment where antibiotics are unable to succeed at therapeutic levels. Due to this, attempts are being made to develop new alternative nanoantibiotics as a promising approach to treat multidrug resistance disease-causing bacteria. Accordingly, there is considerable contemporary attention to the use of nanoparticles (NPs) as antibacterial agents against different pathogens and as target drug delivery toward specific tissues therefore microbes are eliminated by the biocidal properties of nanoantibiotics. Additionally, the utilization of nanoencapsulation systems can help to beat the issues of, those with toxicity natures, and target drug delivery problems. This review encompasses the antibiotic resistance prevalence, mechanisms, and therefore the use of nanoparticles as antibacterial and drug delivery systems to overcome the antibiotic resistance challenges of bacteria. Overall, this review paper provides a conceptual framework for understanding the complexity of the matter of emergence of antibiotic resistance bacteria even for brand spanking new synthesized antibiotics. Therefore the availability of such knowledge will allow researchers to supply detailed studies about the applications of nanoparticles in the treatment of multidrug-resistant bacteria.
