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S & T and Industrial Research

531 An Influence Analysis of the Banking Market Structure on the Industrial Pollutants Emission Reduction

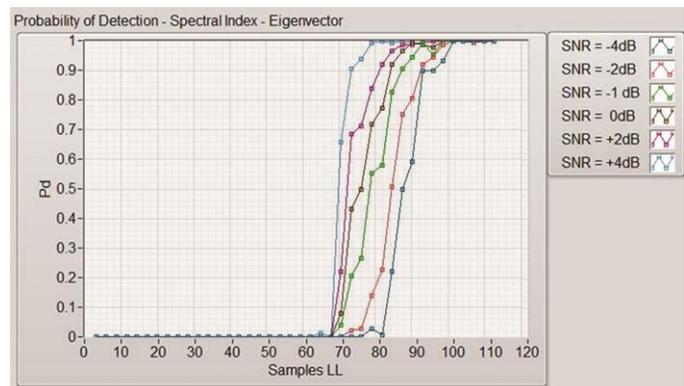
The rapid development of China's industry is characterized by high energy consumption and high pollutants emission, which has resulted in serious environmental problems. In this paper, Chinese provincial panel data are used to study the influence of the banking market structure on the industrial pollutants emission reduction. The results show that the concentration of the banking sector has a significantly positive effect on the industrial pollutants emission intensity. High concentration of the banking sector is not conducive to reducing pollutants emission intensity. Therefore, the banking market structure plays an important role in eliminating outdated production capacity and in the development of the energy-saving and low-polluted economy.

Zhifeng Lin, Weida He, Rong Hao & Zeyu Feng

535 Eigenvector Based Wideband Spectrum Sensing with Sub-Nyquist Sampling for Cognitive Radio

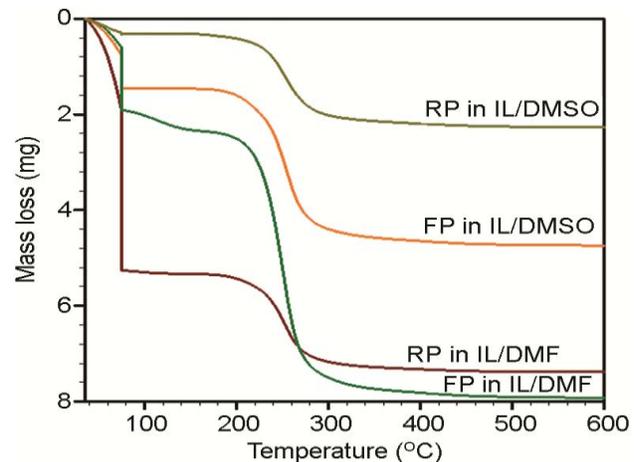
In the Cognitive Radio (CR) technology, fast and precise spectrum sensing is essential, so that the Secondary Users (SUs) can quickly adapt their parameters by dynamic monitoring of the spectrum, enabling them to utilize the available spectrum, and more importantly to prevent interference with Primary Users (PUs). To this effect the implementation of the classical spectrum sensing methods in a wideband scenario is a great challenge. This is because the classical methods need sampling rates greater than or equal to the Nyquist rate. Modern Compressive Sensing (CS) techniques exploit the sparseness of a typical wideband spectrum. In this paper a subNyquist sampling based sensing technique is studied. The correlation matrix of a limited number of samples containing noise is constructed and the Eigenvector (EV) estimator is used to discern the functional channels of the spectrum. The performance of this technique is assessed by calculating the probability of detection of the occupied signal as a function of the number of samples and the SNR parameters of random input. Simulation results show that a robust detection is possible, even with less number of samples and at low SNR.

K Chandrasekhar, Hamsapriye, V D Ingale, S G T Moorthy & K V Lakshmeesha



540 Study of Cellulose-Rich Materials Recovered After Dissolution of Sul-phite Pulp from South African Eucalyptus Wood in [C2mim][OAc]/co-Solvent Mixtures

Biomass processing in ionic liquids (ILs) is a promising technology but involves the simultaneous optimization of many variables in parallel. Here we investigated how dissolution of dissolving wood pulp in IL molecular co-solvents affects the structure of lignocellulosic materials. Mixtures of the IL 1-ethyl-3-methylimidazolium acetate ([C2mim][OAc]) and dimethylsulfoxide (DMSO) or dimethylformamide (DMF) were used to dissolve South African eucalyptus raw (un-bleached) and final (bleached) pulp and regenerated cellulose was obtained by addition of a 1:1 (v/v) water/acetone mixture. The regenerated cellulose materials were characterized by SEM, FTIR, TGA, and PXRD. The results showed that addition of co-solvents led to increased dissolution yields, presumably due to reduction of the IL viscosity facilitating faster dissolution of the wood materials. The selection of the co-solvent for the mixtures did not have a significant influence on the recovered materials, whose characteristics such as crystallinity and thermal stability depended only on the source material. Co-solvents did affect the purity of the recovered material, with DMF appearing to lead to greater contamination. Co-solvent addition is a viable approach for dissolution of dissolving wood pulp without affecting the quality of the recovered material providing removal and recovery of the spent solvents can be optimized.



Z Tywabi, N Deenadayalu & B Sithole

545 High-resolution Spectral Analysis for Fault Detection on Induction Motors Fed by Variable-Speed Drives

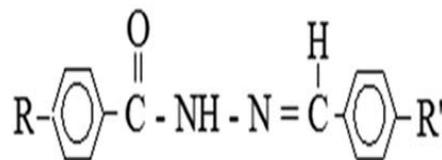
Early detection of rotor faults can prevent the occurrence of catastrophic failures that could interrupt the manufacturing process in critical industries that use different types of inverters. This paper studies the inverter-fed case by analyzing the stator signal with a high-resolution subspace technique for spectral analysis known as multiple signal classification (MUSIC). The technique is compared to the standard fast Fourier transform, showing outstanding advantages to reduce the appearance of false positives. The results show the differences in the detection of faults when five inverters are used, considering also the line supply.

I Martin-Diaz, D Morinigo-Sotelo, O Duque-Perez, A Garcia-Perez, D Camarena-Martinez & R J Romero-Troncoso



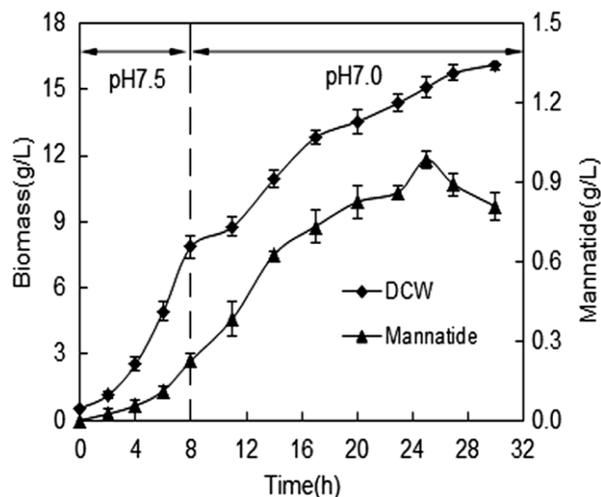
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- 550 **QSAR Modeling of Antimicrobial Activity of some p-substituted Aromatic Hydrazones** QSAR analysis of a series of previously synthesized *p*-substituted aromatic hydrazones tested for growth inhibitory activity against *Bacillus subtilis*, was performed using several physicochemical descriptors: Surface tension (ST), Molar Refraction (MR), Molar Volume (MV), Parachor (Pc), Index of Refractivity (η); Density (D) and Polarizability (α). Two-parameter models were obtained and validated by using several statistical parameters: R; R^2_{adj} ; F-test; Sd; R_{ped} ; PRESS/SSY; Q^2 ; S_{PRESS} ; PSE and Q. Both the parameters (D and α) contributing to statistically best model (model 16) have positive input to the modeling of biological activity of selected hydrazones.



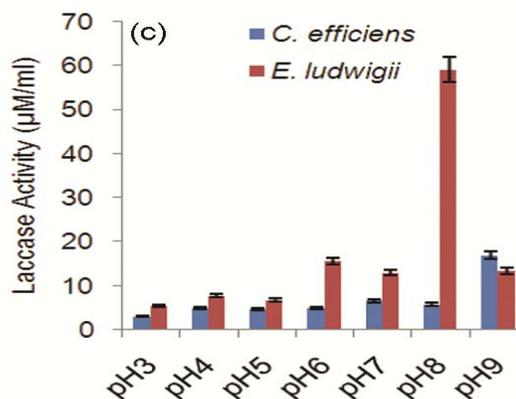
V Dimova & M Jankulovska

- 556 **Production of Mannatide by α -hemolytic Streptococcus Using Batch Fermentation with pH - shift Control** Mannatide was a glycopeptide with a variety of bioactive compounds and isolated from fermentation broth of cultured *α -hemolytic streptococci* strain H1S-33. The influence of pH value on production of mannatide in batch fermentations was studied. The optimal values for biomass and mannatide production occurred at pH 7.5 and 7.0, reaching 17.91 g/L and 0.77 g/L, respectively, at constant pH in 5-L stirred fermenters. As a result, an effective pH-shift control strategy was established for the fermentation of mannatide in 5-L stirred fermenters. In this strategy, pH was controlled to 7.5 for the first 8 h of fermentation, and then subsequently shifted to 7.0 and maintained until the end of the process. The maximal mannatide production (0.98 g/L) was 27.6, 37.6 and 51.5% higher than that of the fermentation at constant pH 7.0 and 7.5 in 5-L stirred fermenters and initial pH 7.5 in shake flasks by taking the pH-shift control strategy. These findings suggested that pH-shift control in batch fermentations of *α -hemolytic Streptococcus H1S-33* could enhance production of mannatide in 5-L stirred fermenters. This study would be helpful for the design of a highly efficient mannatide biosynthesis process.



Jialan Zhang, Cui Xu, Yunlei Wan & Mengxiang Gao

- 562 Production Characteristics, Activity Patterns and Biodecolourisation Applications of Thermostable Laccases from *Corynebacterium Efficiens* and *Enterobacter Ludwigii***
- The production conditions, characteristics and dye decolourisation potentials of two purified bacterial laccases from *Corynebacterium efficiens* and *Enterobacter ludwigii* were investigated. Optimum production pH was 3.0 and 4.0 respectively for *E. ludwigii* and *C. efficiens*. Khaya sp. and Gmelina arborea wood shavings, $(\text{NH}_4)_2\text{SO}_4$ (30.2 $\mu\text{M}/\text{ml}$) and K^+ maximally supported laccase production in both organisms. The V_{max} and specificity constants for both purified laccases were 44.6 $\mu\text{M}/\text{mg}$; 1858.4 $\text{S}^{-1}\mu\text{M}^{-1}$ and 23.15 $\mu\text{M}/\text{mg}$; 1015.4 $\text{S}^{-1}\mu\text{M}^{-1}$ respectively. Maximum laccase activity was between 80°C and 90°C and pH 7.0. In both laccases, Fe^{3+} induced higher activity and red Dylon dye was 69% and 64% decolourised. The properties exhibited by these laccases could enhance their suitability in diverse biotechnological applications.



Odeniyi O A, Unuofin J O, Adebayo-Tayo B C, Wakil S M & Onilude A A

- 570 Radical Copolymerization of N-Substituted Maleimide and Acrylamide (AM)/ Acrylic Acid/ 2-Hydroxy Ethyl Methacrylate: Determination of Monomer Reactivity Ratios**
- The N-[4-(acetyl)phenyl amino] maleimide (APAMI) and its homo and copolymers have been synthesized and structurally characterized by FT-IR and ^1H -NMR spectroscopic methods and biologically by antibacterial and antifungal assays for evaluating their potential use for biomedical applications. The compositions of the copolymers as well as reactivity ratios for applied comonomers were determined by Finemann Ross method. Copolymers (C-APAMI) with various proportions of N-[4-(acetyl)phenyl amino]maleimide (APAMI) and Acrylic acid[AA] were prepared by free radical polymerization in tetrahydrofuran (THF) using 2,2'-azo-bis-isobutyronitrile (AIBN) as an initiator at $70 \pm 2^\circ\text{C}$. The nine copolymer samples were synthesized from different feed ratio of comonomers. Thermal behavior of polymers was evaluated by TGA. Gel permeation chromatography was applied to determine the molecular weights of the polymers.

J Chaudhary, S Purohit, S Jinger & R Chaudhary

Energy and Environment

- 575 Experimental Studies and Test Results on the Energy Efficiency of Household Refrigerating Appliances**
- Refrigerators are a must for every household around the world. They are important in terms of energy efficiency as they exist almost in every home and many of the offices. In addition their consumption counts a considerable percentage of the overall electricity bill. In this study we describe the details of a test cell for household refrigerating appliances' energy efficiency measurement, including equipment and provide the experimental and test results obtained. The test cell, which is inside the test and measurement laboratory is named "Ankara Energy Efficiency in Household Appliances Technologies Research Centre" and it was financially supported by UNDP (United Nations Development Programme). Measurements were recorded according to IEC 62552, Household refrigerating appliances - Characteristics and test methods - Part 3: Energy consumption standard. Test results which confirmed the manufacturer's claimed energy efficiency index of A+++ were recorded and assessed using MATLAB®

Ilhan Kosalay & H Gokhan ILK

CONTENTS

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- 581 Crack Propagation Morphologies of Single-Layered Graphene under Various Low Temperatures**
- The fracture behavior of single layer graphene sheet (SLGS) has been a subject of intensive research in recent years. Understanding the fracture mechanism of graphene under low temperature conditions is crucial for engineering applications of graphene. In this paper, a molecular dynamics (MD) simulation is employed to assess the effect of temperature on fracture properties of SLGS. The evolution of atomically cleaving of graphene is also discussed. A finite area of SLGS is subject to uniaxial tensile load in zigzag direction under various environmental temperatures between 1K and 77K. The effects of temperature on fracture properties as well as cracked morphology of SLGS are investigated. While our simulated results of fracture strength of SLGS agree with reported datum, simulated cracks are nucleated spontaneously instead of artificially inserted. The findings presented herein would help understand the morphology of a single layer pristine graphene sheet subjected to crack propagation at ultralow temperature.
- Chieh Kung & Bin-Hao Chen**
-

Waste Utilization

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- 588 Impact of Organic Loading Rates of Waste Water from Broilers' Manure on CSTR Biogas System**
- This research examines the impact of Organic Loading Rates (OLRs) on a Continuous Stirred Tank Reactor (CSTR) biogas system from the waste water of broilers' manure. The CSTR biogas system is comprised of a 12 m³ raw material mixing tank, a solid/liquid separator, a liquid tank, a 60 m³ reactor, a 10 m³ sludge tank, a 15 m³ biogas balloon, and a biogas flare system. The experiment was performed by examining the changes in the organic loading rates from 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, and 4.0 kg-COD/m³-day. The following parameters of the waste water were measured in order to monitor and control the biogas system: 1) pH, 2) the temperature, 3) the alkalinity, 4) the Volatile Fatty Acids, 5) the Chemical Oxygen Demand (COD), 6) the Total Solids, 7) the Total Dissolved Solids, and 8) the Suspended Solid & Volatile Solid (VS). From the experiment, it was found that the average biogas production was 19.34 m³/day and that the average biogas production rate was 0.30 m³/kg-COD or 0.35 m³/kg-VS. The composition of the biogas was methane (62.37%) and carbon dioxide (31.33%). In addition, the results showed that the production rate regarding the volume of biogas increased as the OLRs increased, then decreased after the Organic Loading Rates reached 3.0 kg-COD/m³-day. The appropriate organic loading rate for operating the CSTR system was found to be 3.0 kg-COD/m³-day, which yielded the maximum biogas production rate for the system.
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A Srichat, R Suntivarakorn & K Kamwilaisak



Author-Reader Platform

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- 594 Instructions to contributors**
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