J Material Sci Eng 2013, 2:4
http://dx.doi.org/10.4172/2169-0022.S1.012

OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference and Exhibition on
Materials Science & Engineering

October 07-09, 2013 Hampton Inn Tropicana, Las Vegas, NV, USA

Removal of fluoride from water through high capacity Zr-Mn composite material

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Fluoride due to its toxic nature can be harmful to human body if taken in excess amount. Millions of people are suffering from serious crippling bone diseases due to elevated levels of fluoride present in drinking water. The research made a novel Zr-Mn composite material with high sorption capacity for fluoride through co-precipitation method for the adsorption of fluoride from water. The adsorption was confirmed by the use of various techniques like X-ray diffraction (XRD) analysis, Fourier transform infrared (FT-IR), Brunauer, Emmett and Teller (BET). 90% fluoride removal was achieved using 1.2g/50mL of adsorbent dose and contact time 145 min at pH 7. The effectiveness of the sorption process on the adsorbent (Zr-Mn composite material) was verified by testing it on natural waters loaded with the proposed fluoride. The process comes out to be easy as well as cost effective for adsorption of fluoride, it also follows Freundlich and Langmuir isotherms of adsorption.

Keywords: Fluoride, Water-treatment, Zr-Mn composite material, Adsorption.

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Synthesis of hybrid black toner from waste toner using nano technology - optimization technique

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The toner is used in photocopiers to form the latent electrical image on the drum. The paper picks up the toner particles (image), when it slides over the drum. Approximately 10% of toner particles are left over the drum due to specific factors. This left out toner is cleaned by the unit to ensure the copy quality of the proceeding copies. This left out toner is called as waste toner and is collected in cleaner sump. If this waste toner is used in the photocopiers, the quality of the copier is reduced. The waste toner is mixed in proportion with Carbon Black Nano powder and original toner to get Hybrid Carbon Black Toner. The original toner is the toner prescribed for the photocopier by the manufacturer. By implementation of this technique, the cost of photocopy can be reduced and the quality of the photocopy can be increased.

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First principles study of electronic properties of ReAs (Re = Gd,Tb,Dy) compounds

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Studied on the electronic properties in field of spin electronics (spintronics) of semi-conductor material (Arsenic) doped by Ionic atom of Rare-Earth, ReAs (Re = Gd,Tb,Dy) in NaCl type (B1) phase, were analyzed by performing ab-initio calculations using the Full-Potential Linear Augmented Plane Wave (FP-LAPW) method based on Density Functional Theory (DFT) within the Local Spin Density Approximation (LSDA) and corrected by Local Spin Density Approximation with Hubbard-U correction (LSDA+U) and the modified Becke-Johnson potential (mBJ) using the Spin Polarized. The calculations indicate are compared with the available experimental and theoretical data. The LSDA+U strategy provides better description of crystals properties and shows significant impact on the energy levels of (d) and (f) states in the electronic structure of these compounds.

Key words: The spintronics, Rare-earth compounds, Electronic properties, Band structure, density of states, FP-LAPW, WIEN2k.

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