University of Puerto Rico
Chemistry Deartment
Departamental Seminar

Friday 21 of August, 2015

11:30 AM

Abbot Room

by

Dr. Beer Pal Singh

Physics Department - UPRM

Iron oxide nanoparticles: facile synthesis, characterization and their use for electrochemical sensing of acetaminophen

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Abstract

Iron oxide nanoparticles were synthesized using co-precipitation method via subsequent heat treatment using ferrous chloride ($FeCl_2.4H_2O$) as a source of iron. The as-synthesized powder of magnetite (Fe_3O_4) nanoparticles was annealed at 700^oC in air atmosphere to transform hematite (α-Fe_2O_3) phase. The synthesized Fe_3O_4 and α-Fe_2O_3 nanoparticles were characterized using X-ray diffraction (XRD), thermogravimetric (TG) and differential scanning calorimetric (DSC) analysis, Raman, Fourier transform infrared (FTIR) and absorption spectroscopy. The XRD patterns were used to studied the phase, crystal structure and particle size of as-synthesized nanoparticles. The thermal behavior and weight loss of Fe_3O_4 was studied by TG-DSC analysis, which facilitates to decide the annealing temperature in transition to α-Fe_2O_3 phase. The as-prepared Fe_3O_4 and α-Fe_2O_3 nanoparticles were found electrochemical active towards acetaminophen ($C_6H_9NO_2$) and used for electrochemical sensing of the acetaminophen. The sensing was performed by Fe_3O_4 and α-Fe_2O_3 nanoparticles modified glassy carbon (GC) electrode using a potential controlled cyclic voltammetric (CV) electrochemical technique.