Synthesis, Characterization and Magnetic Properties of Nickel (Ni) Quantum Dots by Glucose Reduction Solution Process

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Nickel quantum dots were synthesized via a straight forward, economically viable approach by using nontoxic D-(+) Glucose and ammonia in aqueous medium. In our synthesis condition, glucose acts as a reducing agent as well as capping agent which makes nickel quantum dots stable in the solution. Field emission scanning electron microscopy (FESEM), transmission electron microscopy (TEM), electron diffraction (ED), UV/Vis spectroscopy, and X-ray diffraction (XRD) techniques were used to characterize as-synthesized nickel quantum dots. Moreover, chemical reactions and growth process involved in the synthesis of nickel quantum dots are also discussed. The magnetic measurement with temperature and field dependent magnetization (M-H) is showing a ferromagnetic behavior for as-synthesized nickel quantum dots. In zero field cooled (ZFC) curve, the peak observed at ~15 K could be attributed to the blocking temperature (TB). Moreover, at room temperature the saturation magnetization (MS), remanent magnetization (Mr), and coercivity (Hc) were observed as 35.57 emu/g, 11.77 emu/g, and 161 Oe, respectively.