Synthesis of gold-coated magnetite nanoparticles

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Nanometer-size materials represent an "intermediate" dimension between bulk materials and atoms/molecules, so metallic and semiconducting particles of nanometer scale have been the subject of substantial research in recent years. Among these materials, bimetallic nanocomposites having core-shell structure have received special attention because of their electronic, magnetic and optical properties.

In this poster we describe the preparation of Fe_3O_4 nanoparticles by the microemulsion method and their coating with gold metal using different concentrations of glucose as reducing agent, to impress optical properties to the magnetic core particles. This reaction was followed in situ by UV-visible spectroscopy confirming the presence of the Au shell because of the appearance of its plasmon absorption band. The coating was confirmed by X-ray diffraction comparing the uncoated magnetite and the gold patterns with the difractograms observed of the coated particles. Transmission Electron Microscopy showed the changes in size when the Fe_3O_4 particles are covered with the gold shell. They also show that the Fe_3O_4@Au particles are nearly spherical and have a narrow size distribution. The characterization of these nanoparticles was completed by temperature dependent magnetic studies, showing the effect of the shell size in the coated particles on the basic magnetic parameters.

Figures:

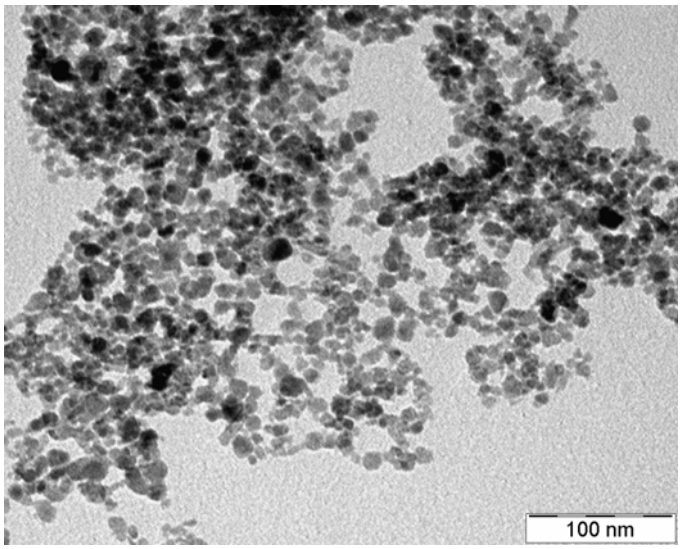

Figure1. Magnetite nanoparticles

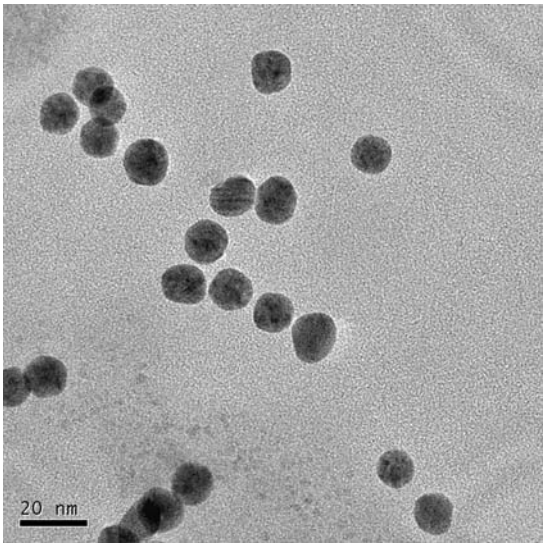

Figure2. Nanoparticles of Fe_3O_4@Au