

Magnetic–luminescent nanoparticles have shown great promise in various biomedical applications namely: contrast agents for magnetic resonance imaging, multifunctional drug carrier system, magnetic separation of cells, cell tracking, immunoassay, and magnetic bioseparation. This experiment describes the synthesis of a nanocomposite material, which is composed of an iron oxide (Fe_3O_4) superparamagnetic core and an indium phosphide/zinc selenide (InP/ZnSe) quantum dot shell. The magnetic nanoparticles (MNP's) and quantum dots (QD's) were synthesized separately before allowing them to conjugate. The MNP's were functionalized with a thiol-group allowing the QD shell to bind to the surface of the MNP by the formation of a thiol–metal bond. The nanocomposite was capped with 3-mercaptopropionic acid, oleylamine, β -cyclodextrin and their influence on the photoluminescence investigated. The synthesized nanocomposite was characterized with high- resolution transmission electron microscopy (HR-TEM), energy-dispersive spectroscopy (EDS), selective electron area diffraction (SAED), scanning electron microscopy (SEM), superconducting quantum interference device (SQUID), and photoluminescence. These techniques yielded particle size, morphology, dispersion, and chemical composition including luminescence and florescence.