Green Biosynthesis and Characterization of Magnetic Iron Oxides (Fe2O3, Fe3O4) Nanoparticles Using Pomegranate (Punica Granatum) Aqueous Extract

Allahverdiyeva, Nargiz

Imranov, Jamil

The process of development of reliable metallic nanoparticles has become a matter of great interest in recent times. To achieve this, the use of natural biological systems becomes essential. Our purpose is biological synthesis and characterization of iron nanoparticles from pomegranate. The exploitation of different plant materials for the biosynthesis of nanoparticles is considered a green technology because it does not involve any harmful chemicals. We have 5 methods: EPR (Electron Paramagnet Resonance), TEM (Transmission Electron Microscope), SEM (Scanning Electron Microscope), UV-Vis (Ultraviolet-visible spectroscopy), FTIR Spectroscopy (Fourier Transformation Infra Red). Different parameters like extract concentrations, temperature and contact time were also experimented. In the present study, we report synthesis of (Fe2O3, Fe3O4) NPs using a rapid, single step and completely green biosynthetic method by reduction of ferric chloride solution with pomegranate (BS, Punica granatum) water extract as a reducing and capping agent.. After the exposure of Fe ions to aqueous extract of pomegranate seed, rapid reduction of iron ions was observed, leading to formation of iron nanoparticles in solution which is due to the presence of phytochemicals. The structural and properties of the Fe2O3, Fe3O4-NPs were investigated by Fourier transformation Infra Red Spectroscopy(FTIR), Electron Paramagnet Resonance Spectroscopy (EPR), Transmission Electron Microscope (TEM), Scanning Electron Microscope (SEM), Ultraviolet-visible Spectroscopy (UV- vis). The average core size of FeNPs was in range 27÷5nm. Iron nanoparticles are increasingly being applied in site remediation and hazardous waste treatment. Magnetic nanoparticles are also used in the treatment of tumor.