**Abstract**

The TiO2 nano particles are synthesized of Manganese doping through a novel hydrothermal method. The undoped and doped nanostructures were systematically investigated employing X-ray diffraction (XRD), field emission scanning electron microscope (FESEM), and Fourier transform infrared (FTIR) analysis. The space group of the material and associated lattice parameters was ascertained through XRD analysis. The Energy Dispersive Spectroscopy analysis gives the proportion of the chemical composition of the sample synthesized with and without Mn doping. The magnetic properties of the compound are measured through Vibration sample magnetometer (VSM). It is observed that the ferromagnetic behavior of the compound improved largely due to the replacement of Mn ions with Ti. This enhanced ferromagnetic property of the material will be functional for the dilute magnetic semiconductors (DMS). From these observed results, room temperature ferromagnetism behavior can be explained by polaron formation of charge carriers.