

# **Novel iron oxide–silica coreshell powders compacted by using pulsed electric current sintering: Optical and magnetic properties**

## **Abstract**

The properties of the bulk materials consolidated of silica coreshell powders with iron oxide core have been studied. Iron oxide nanoparticles smaller than 20 nm in size were synthesized by a reverse co-precipitation process in ambient atmosphere. Coreshell structures with various amounts of iron oxide were prepared via a modified Stöber method. The powders were compacted by using pulsed electric current sintering (PECS) at 1373 K. The morphologies, microstructures, phases, optical, and magnetic properties of the samples were studied by using transmission electron microscope (TEM), scanning electron microscope (SEM), X-ray diffraction (XRD), UV–visible spectroscopy (UV–Vis), and vibrating sample magnetometer (VSM). Transmittance values in the 250–800 nm range varied with the amount of iron oxide. Sample with the lower content was transparent while the sample with the highest content was opaque with microporosity. The compact with the highest iron oxide content showed the ferromagnetic behaviour at 300 K. The phase transformations in the coreshell powders during the sintering process are discussed.