

Sintering temperature dependence of evolving morphologies and magnetic properties of Ni_{0.5}Zn_{0.5}Fe₂O₄ synthesized via mechanical alloying

ABSTRACT

We report on an investigation to unravel morphological and magnetic-property dependence on sintering temperature for samples of Ni_{0.5}Zn_{0.5}Fe₂O₄ synthesized via mechanical alloying. The samples were sintered at various sintering temperatures from 800 °C to 1000 °C. The morphology of the samples was studied by means of scanning electron microscopy (SEM); hysteresis and permeability measurement were carried out using a BH hysteresisgraph system and an impedance analyzer, respectively. The morphological studies show a microstructural evolution with the increase of sintering temperature. The relationship between ordered magnetism and the microstructure of the samples show that the important grain-size threshold for the appearance of significant ordered magnetism (mainly ferromagnetism) is about $\times 0.3 \mu\text{m}$. We found that two factors sensitively influenced the samples content of ordered magnetism, their ferrite-phase crystallinity degree and the number of grains above the critical grain size.

Keyword: Hysteresis; Magnetic materials; Magnetic properties; Sintering