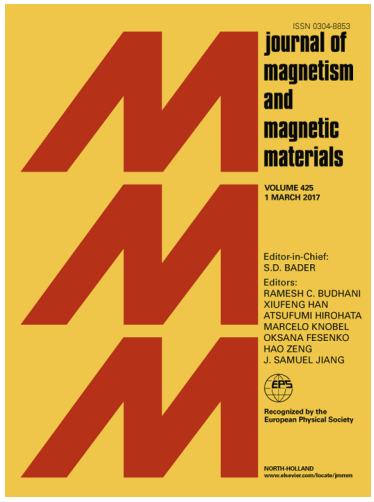

Research articles

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Synthesis of metal-doped Mn-Zn ferrite from the leaching solutions of vanadium slag using hydrothermal method

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A B S T R A C T

Using vanadium slag as raw material, Metal-doped Mn-Zn ferrites were synthesized by multi-step processes including chlorination of iron and manganese by NH_4Cl, selective oxidation of Fe cation, and hydrothermal synthesis. The phase composition and magnetic properties of synthesized metal-doped Mn-Zn ferrite were characterized by X-ray powder diffraction, Raman spectroscopy, transmission electron microscopy (TEM), X-ray photon spectra (XPS) and physical property measurement. It was found that Mn/Zn mole ratio significantly affected the magnetic properties and $ZnCl_2$ content significantly influenced the purity of the phase of ferrite. Synthesized metal-doped Mn-Zn ferrite, exhibiting a larger saturation magnetization (Ms=60.01 emu/g) and lower coercivity (Hc=8.9 Oe), was obtained when the hydrothermal temperature was controlled at 200 ℃ for 12h with a Mn/Zn mole ratio of 4. The effect of $ZnCl_2$ content, Mn/Zn mole ratio and temperature on magnetic properties of the synthesized metal-doped Mn-Zn ferrite were systemically investigated. This process provided a new insight to utilize resources in the aim of obtaining functional materials.

Keywords: vanadium slag, ammonium chloride, metal-doped Mn-Zn ferrite