# Structural and magnetic properties of SRM0.5FE11.5O19 (M: TI4+, CO2+, NI2+, CU2+, and ZN2+) derived from steel waste product via mechanical alloying


## ABSTRACT

This paper presents the steel waste product used as the main source of raw material in the preparation of permanent magnets ferrites, substitution with transition metal cation. M-type hexaferrites of SrM0.5Fe11.5O19 (M: Ti, Co, Ni, Cu, and Zn) component were investigated. Samples were prepared by Mechanical Alloying (MA) process and analysis microstructure of samples were characterized by using X-ray Diffraction (XRD). The specific saturation magnetization Ms, the coercivity Hc and remanence Mr was carried out using Bï H hysteresis measurement. The XRD patterns show single phase of the magnetoplumbite strontium ferrite and Fe2O3 phases were only present in Ti4+ substitution. Significant increase in calculated lattice parameter a, c and cell volume Vcell from XRD indicating solubility of substituted cation in hexagonal structure of strontium ferrite. Magnetization measurements discovered that saturation magnetization Ms of the all samples proportional to magnetic moment ε B of substituted cation with highest 28.33 emu/g from Co2+.While highest coercivity 26.5 kA/m from Co2+ and for remanence Zn2+ 0.955 Tesla. The magnetic properties such as remanence Br and coercivity Hc make the synthesized materials useful for high density recording media and permanent magnets.



**Keyword:** Steel waste; Permanent magnets ferrites