

## Accepted Manuscript

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PII: S0577-9073(18)30684-1  
DOI: <https://doi.org/10.1016/j.cjph.2018.07.011>  
Reference: CJPH 592



To appear in: *Chinese Journal of Physics*

Received date: 11 May 2018  
Revised date: 8 July 2018  
Accepted date: 19 July 2018

Please cite this article as: Yujie Yang , Juxiang Shao , Fanhou Wang , Duohui Huang , Zhen Wu , Synthesis, crystal structure and magnetic characterization of  $\text{Pr}^{3+}$  and  $\text{Zn}^{2+}$  ions co-doped hexagonal ferrites via the ceramic process, *Chinese Journal of Physics* (2018), doi: <https://doi.org/10.1016/j.cjph.2018.07.011>

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# Synthesis, crystal structure and magnetic characterization of $\text{Pr}^{3+}$ and $\text{Zn}^{2+}$ ions co-doped hexagonal ferrites via the ceramic process

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## Highlights

1. Hexaferrites  $\text{Ca}_{0.2}\text{Sr}_{0.8-x}\text{Pr}_x\text{Fe}_{12-y}\text{Zn}_y\text{O}_{19}$  ( $x=0.00-0.40$ ,  $y=0.00-0.30$ ) were prepared by the ceramic process.
2. Single M-type hexaferrite phase is obtained in all Pr-Zn doped hexaferrites.
3.  $M_s$ ,  $M_r$  and  $M_r/M_s$  ratio reach to the maximum values at  $x=0.24$ ,  $y=0.18$ .
4.  $H_a$ ,  $K_{\text{eff}}$  and  $H_c$  reach to the maximum values at  $x=0.16$ ,  $y=0.12$ .

## Abstract

M-type hexaferrites  $\text{Ca}_{0.2}\text{Sr}_{0.8-x}\text{Pr}_x\text{Fe}_{12-y}\text{Zn}_y\text{O}_{19}$  ( $0.00 \leq x \leq 0.40$ ,  $0.00 \leq y \leq 0.30$ ) were synthesized by the ceramic process. The X-ray diffraction (XRD), field emission scanning electron microscopy (FE-SEM) and a vibrating sample magnetometer (VSM) were used to investigate microstructure and magnetic properties of the M-type hexaferrites. The single-phase with hexagonal structure was obtained in all Pr-Zn substituted M-type hexaferrites, and with increasing Pr-Zn content, the  $2\theta$  values of (107) and (114) peaks shifted towards higher angles. With increasing Pr-Zn content, the lattice constant  $a$  basically kept unchanged, while the lattice constant  $c$  decreased.

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