

# Effect of Synthesis temperature on magnetic properties of SmFeO<sub>3</sub> nanoparticles

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**Abstract:** This study aims to investigate the effect of varying synthesis temperatures on the structural and magnetic characteristics of SmFeO<sub>3</sub> (SFO) nanoparticles. The nanoparticles were synthesized using a sol-gel method at different three different temperatures- 500°C, 600°C and 700°C. The structural analysis was performed using X-ray diffraction (XRD) and scanning electron microscopy (SEM), while the magnetic properties were evaluated using a SQUID magnetometer. The results indicate that the magnetic properties of SFO nanoparticles are significantly influenced by the synthesis temperature. As the temperature increases, the crystallite size and particle morphology change, leading to variations in the magnetic behavior. The nanoparticles synthesized at higher temperatures exhibit enhanced ferromagnetic properties with increased saturation magnetization and coercivity. The study provides insights into the optimization of synthesis conditions to tailor the magnetic properties of SFO nanoparticles for potential applications in magnetic devices and materials.

## References:

1. M. Kamal Warshi, Vikash Mishra, Archana Sagdeo, Vinayak Mishra, Rajesh Kumar, P.R. Sagdeo, Structural, optical and electronic properties of RFeO<sub>3</sub>, *Ceramics International*, Volume 44, Issue 7, 2018, Pages 8344-8349.
2. Meng Wang, Ting Wang, S.-H. Song, Muchakayala Ravi, R.-C. Liu, S.-S. Ji, Effect of calcination temperature on structural, magnetic and optical properties of multiferroic YFeO<sub>3</sub> nanopowders synthesized by a low temperature solid-state reaction, *Ceramics International*, Volume 43, Issue 13, 2017, Pages 10270-10276,