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**Metal-semiconductor transition and Seebeck inversion in CoFe<sub>2</sub>O<sub>4</sub> nanoparticles**Sunil Kumar<sup>1</sup>, Sandeep Munjal<sup>2</sup>, Neeraj Khare<sup>\*</sup>*Department of Physics, Indian Institute of Technology Delhi, Hauz Khas, New Delhi, Delhi-110016, India.*

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**\*Corresponding Author.** Cont. +9101126591352**Abstract:**

A Semiconductor to metal transition has been observed in hydrothermally synthesized CoFe<sub>2</sub>O<sub>4</sub> (CFO) nanoparticles. Temperature dependent Seebeck coefficient was measured in order to confirm the type of majority charge carriers and conductivity vs. temperature measurement was performed to get the activation energy. The CFO nanoparticles shows p-type semiconducting behaviour at lower temperature as confirmed by the sign of Seebeck coefficient and at elevated temperatures a sign inversion in Seebeck voltage was observed. The p-type and n-type semiconducting behaviour have been attributed to hopping of holes and electrons between Co<sup>3+</sup>- Co<sup>2+</sup> and Fe<sup>2+</sup> - Fe<sup>3+</sup> respectively dominating at different temperatures.

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