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# Effect of Surface Potential and Charge Transfer Mechanism in Reduced Graphene Oxide and Magnetic Nanocomposites

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## Graphical abstract

In this paper, the charge transfer mechanism in hydrothermally synthesized cobalt oxide/reduced graphene oxide (Co<sub>3</sub>O<sub>4</sub>/RGO) nanocomposites has been established. Scanning and transmission electron microscopy results expose the decoration of Co<sub>3</sub>O<sub>4</sub> nanoparticles on GO sheets. Magnetic response of nanocomposites was confirmed from superconducting quantum interference device magnetometer measurement. Raman spectroscopy investigated optical properties of these nanocomposites. The Raman spectra of Co<sub>3</sub>O<sub>4</sub>/RGO nanocomposites shows the enhancement of D and G bands which are associated with GO due to the Surface-enhanced Raman spectroscopy effect and blue shift. Increase in the full-width half-maximum value as well as upshift in D and G peaks are strong signals of association of charge transfer process between GO sheets and decorated Co<sub>3</sub>O<sub>4</sub> nanoparticles. The effect of charge transfer process is measured in the expression of shifting of Fermi energy level of Co<sub>3</sub>O<sub>4</sub>/RGO nanocomposites. Charge transfer is correlated with observed Raman shift and scanning Kelvin probe microscopy. XRD spectra of Co<sub>3</sub>O<sub>4</sub>/RGO confirm the polycrystalline nature of Co<sub>3</sub>O<sub>4</sub> nanoparticles.

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