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## Magnetic properties of Co doped WSe<sub>2</sub> by implantation

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### Abstract

In this research, the potential of transition metal doped 2D WSe<sub>2</sub> as a 2D dilute magnetic semiconductor has been explored experimentally. Single crystal WSe<sub>2</sub> was doped with Co with various concentrations by a physical implantation method. Raman and X-ray diffraction spectra indicate the effective doping of Co in the substitutional sites. Secondary ion mass spectrometry results demonstrate the Gaussian distribution of Co in WSe<sub>2</sub>. Magnetic measurements show that both un-doped WSe<sub>2</sub> and WSe<sub>2</sub> doped with Co exhibit weak ferromagnetism at room temperature. The magnetization is increased with Co doping compared to un-doped WSe<sub>2</sub> and it tends to be enhanced with increasing doping concentration.

**KEYWORDS:** *Two-dimensional Materials; Transition metal dichalcogenides (TMDCs); Ion Implantation; Magnetic properties; Ferromagnetism; Diluted magnetic semiconductor (DMS)*

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