Effect of cobalt doping on the magnetic properties of graphene nanoribbons

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Abstract

Carbon based materials such as fullerene, carbon nanotubes, graphene and its derivatives have good candidates for various applications due to unique properties. In this work, we have focused on structural and magnetic properties of cobalt doped graphene nanoribbons (GNRs). The effect of Co on tuning of the electronic band structure which play crucial role in contribution of calculated magnetic moment of as synthesized GNRs through chemical reduction of graphene oxide nanoribbons using hydrazine and first principle calculations based on density-functional theory (DFT). Field emission scanning electron microscope with EDX analysis and X-ray diffraction pattern were confirmed the doping of Co into the GNRs matrix. Moreover, the results obtained from VSM analysis are clearly revealed that improved saturation magnetization (Ms) from 7.95×10^{-3} $emug^{-1}$ to 12.68×10^{-3} $emug^{-1}$, due to the presence of Co content in pristine GNRs. The achieved magnetizations curve show ferromagnetic behaviour at room temperature. The Co doped GNRs exhibited interesting magnetic properties which create much attention towards its applications such as spintronics devices and some related fields.