

## RF sputtered CuO thin films for spintronics application

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Recently, metal oxide semiconductors in the form of 1D, 2D and 3D nanostructures [1] manifesting peerless physical and chemical features are hopeful elements for a large variety of applications [2]. Cupric oxide (CuO) belongs to this family and in general, it is a p-type semiconductor with relatively low energy band gap of  $\sim (1.2 \text{ eV to } 2.1 \text{ eV})$  [3]. However, it is also appreciated as an n-type semiconductor with a monoclinic lattice structure. In this research work, we have investigated structural and magnetic properties of nanocrystalline CuO thin films deposited for 600, 1200 and 1800 s on Si substrate at 300 °C using RF magnetron sputtering technique.

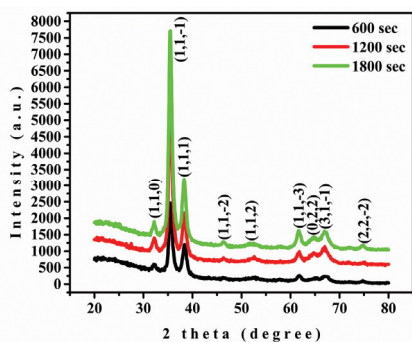


Figure 1: XRD spectra

XRD results verify the well crystalline nature of the films without any impurity as no diffraction peak on the behalf of any organic/inorganic impurities is present in the patterns (Figure 1). The films deposited at 300 °C substrate temperature were crystalline and showed Tenorite phase of CuO. It can be observed from the low and high magnification FESEM images shown in Figure 2 that the change in the film thickness is linearly related to the change in deposition time which confirms the high controllability of the RF sputtering technique. The magnetic data (M-H curves) taken at room temperature as shown in Figure 3 revealed that all the samples exhibit room temperature ferromagnetism due to the evolution of oxygen

vacancies in the CuO system with increasing thickness.

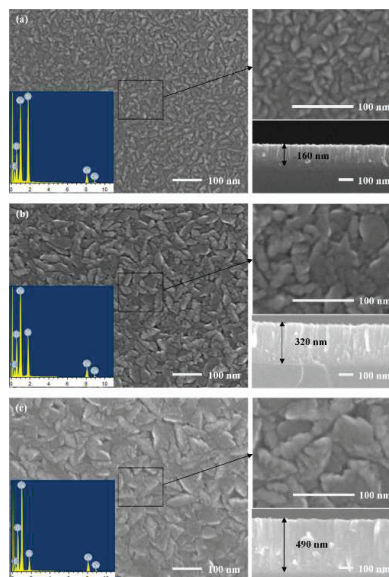


Figure 2: FESEM images, cross-section and EDS spectrum of CuO thin films deposited for (a) 600 s, (b) 1200 s and (c) 1800 s

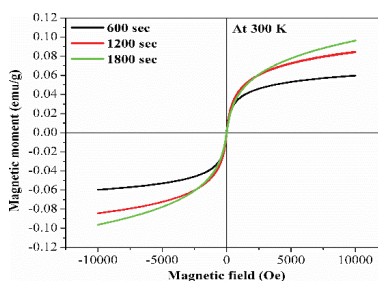


Figure 3: M-H curves for CuO thin films

## References

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