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Cu ion beam induced effects and phase study in vanadium oxide thin films

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The recent studies of vanadium oxide thin films have lead towards the tug of war between the polymorphs of vanadium. The present work focused on optical properties and phase transition in VO2. The deposition of vanadium thin films on glass/Si substrates was carried on in the range of less than 100 nm thickness through magnetron sputtering. The tandem accelerator facility was used to exploit the 5 MeV Cu ion source with variable doses of 160 μc, 600 μc, 800 μc by creating focused ion beam over the vanadium oxide (M) phase thin film. The X-ray diffraction (XRD) confirmed the tetragonal structural phase of VO2. The Raman spectroscopy showed a considerable shift that confirmed the structural and phase change from tetragonal to monoclinic. The diffuse reflectance spectroscopy (DRS) showed some promising percentage of reflectance at specific wavelengths providing enhanced optical properties. The surface morphology was observed through high resolution atomic force microscopy (AFM). The AFM results show variant grain size and surfaces roughness with respect to the induced variable irradiation doses applied. The smooth surface was observed at a comparatively high dose of the irradiation.

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