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Semiconductor behavior and room temperature ferromagnetism in e-beam evaporated Co/TiO₂ multilayer thin films

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The Co/TiO₂ multilayer thin films have been deposited by e-beam evaporation method on glass substrates in vacuum and annealed in air at 773 K for 1 hour. The crystal structure, surface morphology, optical properties, electrical properties and magnetic properties of Co/TiO₂ multilayer thin films have been systematically investigated. The results showed that the particle sizes were significantly reduced when the samples are annealed and the enlargement of particle size occurred when the samples thickness is increased. The spectroscopic analysis exhibited enhanced transmittance and higher optical band gap of annealed sample than the as-deposited one and it was decreased with sample thickness. The resistivity measurement confirmed resistivity decreament with temperature. Furthermore, by investigating the magnetic properties, room temperature ferromagnetism was observed.

Keywords: Co/TiO₂ multilayer, E-beam evaporation method, grain size, band gap, room temperature ferromagnetism.

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