

Morphology, composition, structure and optical properties of thermal annealed Cu₂O thin films prepared by reactive DC sputtering method

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Cu₂O is nowadays a very promising candidate for thin-film photovoltaic absorber layer, provided proper morphology and opto-electronic parameters will be achieved. Cu₂O films deposited on glass and silicon were obtained by magnetron sputtering using of Modular Platform PREVAC and then films were thermally treated by annealing in oxygen atmosphere for 60 min at 450°C. The properties of samples were determined by scanning electron microscopy (SEM) and X-ray diffraction (XRD) analysis. Additionally basic material properties such as thickness, layer structure and optical properties were examined. All obtained films have nanocrystalline structure with average grain diameter in the range of 20÷40 nm before thermal treatment and 50÷90 nm after annealed. Optical measurements detected that the films have wide band gap within the range 2.20÷2.48 eV before and 2.00-2.40 eV after annealed. The article presents detailed discussion of annealing process influence on Cu₂O thin film morphology and parameters considering possible photovoltaic application in polycrystalline heterostructure.