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Influence of temperature annealing on structural and optical properties of α-MoO_3 films prepared by a spray pyrolysis method

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Layers of polycrystalline molybdenum trioxide (MoO_3) thin films were successfully deposited on fluorine-doped tin oxide (FTO) coated glass by a spray pyrolysis technique at the deposition temperature of 425℃ for 1 hour. The prepared films were further annealed at 500 ^{o}C for 0.5, 1, 1.5, 2 and 3 hours. The effect of the annealing periods of time on their structural, morphological and optical properties was methodically investigated. The XRD results indicate that the films show high crystallinity with an orthorhombic crystal structure of α-MoO_3 phase after the post-annealing treatment. The films annealed for 1 hour exhibit the strongest (020) preferred orientation with their lattice parameters of a = 3.939 Å, b = 13.728 Å and c = 3.682 Å. The surface morphology of the films presents rod-like particles and their sizes appear to become larger with increasing the annealing times. The values of optical band gap of the films obtained from absorbance spectra are varied in a range of 3.02-3.32 eV, depending on the annealing times.

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