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| **Abstract:** |  |
| Intrinsic zinc oxide thin films have deficiencies in terms of structural, optical and electronic characteristics, which has given rise to researches on metal doped zinc oxide films in the interest of enhancing its characteristics. Indium tin oxide, Au, Ag, Pt and Ti; which are extensively used in industrial level thin film applications but aluminum has low cost than those metals, so by doping with this on ZnO thin films, its performance and quality on the morphological, elemental, structural, optical and electrical attributes were analyzed in this research. Tuning of ZnO nanocrystalline thin films’ optical band gap, doped by different materials simplifies possible elements for photonic applications. Sol–gel spin coating method has been used for these analyses which was accustomed to gain the Al doped ZnO (AZO) parent compounds on silicon-glass substrates. Ultra violet visible spectrophotometer was used to determine band gap tuning characteristics, urbach energy, transmittance and absorption properties. The Moss-Burstein outcome imprints the blue shift with thickness increment of the absorption end and there is a clear relationship between band gap and urbach energy. Tuning of band gap value varies from 3.22 eV to 3.26 eV by varying the film thickness from 100 to 300 nm. A non-linear, non-monotonic relation has been seen for the change of optical and structural parameters of AZO thin films. Deep research of structural and optical properties represents important information to get a better perspective of band gap dependence on structural properties. | |