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| **Abstract:** |  |
| In this research, the influence of doping variations of Mg-doped zinc oxide (ZnO) and the impact upon the optical and electrical properties were analyzed. The sol-gel spin coating method was employed to deposit Mg-doped ZnO (MZO) thin-films. The thin-films have been deposited on glass substrates, maintaining a uniform thickness of 200 nm (with 2% fabrication tolerance). Ultraviolet-visible (UV-Vis) Spectrophotometer has been utilized to determine different optical and ECOPIA Hall effect measurement system has been used to determine electrical parameters. With the increment of doping concentration, nonlinear variation of skin depth has been observed. The maximum figure of merit observed in the current research is 562 (10 -6 Ω -1 ) for doping concentration of 4 at.%, sheet resistance of 1725 (Ω/square) and transmittance (99%). For doping concentration of 8 at.%, high transmittance (99%) and small sheet resistance (1725) (Ω/square) has been observed for 4 at.% MZO. The above mentioned transmittance and small sheet resistance is highly desirable for fabrication as dye-sensitized solar cells. Moreover, their high absorption indices ( 1-1.4 cm for 6 at.% MZO) might be suitable for filters and modulators, switches etc. | |