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# Sol-gel derived aluminum doped zinc oxide (AZO) films

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## Abstract

Among transparent conducting oxides (TCOs), which are widely used in the design of electronic devices and solar cells due to their high transparency in visible light wavelengths and superior electrical conductivity(1), ZnO based ones are favored for their wide-bandgaps(2). Doping ZnO with Al, Ga, or In is an effective method for reducing its electrical resistivity(3). Despite the altered lattice structure of ZnO, AZO exhibits non-toxicity, cost efficiency, high stability in hydrogen plasma, and shallow donor levels due to the substitution of Zn<sup>2+</sup> with Al<sup>3+</sup>(4,5). The objective of the study is to achieve precise control over the optoelectronic properties of AZO thin films through N doping. A facile sol-gel dip coating method has been employed for the fabrication of AZO thin films. Subsequently, post-thermal nitrification of AZO films will be examined by thermally decomposing NH<sub>3</sub> at elevated temperatures to further modulate optoelectronic properties with N doping, which is considered the most promising p-type dopant with its similar electronic structure to oxygen and possessing a low ionization energy (6).

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