

## Influence of Annealing Temperature and Ga Concentration on Ga-doped ZnO Transparent Thin Films by Sol-gel dip coating Methods

*Thursday, June 9, 2016 2:15 PM (15 minutes)*

In this work, ZnO transparent conductive thin films doped with 0-5 at% of Gallium (GZO thin films) have been prepared. GZO thin films were deposited by sol-gel dip coating method. Each dip-coated film was baked at 250°C for 5 min and then annealed at 300°C, 400°C, and 500°C for 2 hr under air ambiance. The effects of Ga dopant and annealing temperature on the structure, electrical resistivity, and important optical properties were investigated. Transmission spectrum shows high optical transparency in high-temperature annealed. XRD results and SEM images exhibit the significant change in the film's morphologies and crystallinity with variation in Ga doping content. Meanwhile increasing annealing temperature results in the significant enhancement in its crystallinity. The electrical properties measured by four-point probe technique can be enhanced by the incorporation of Ga dopant.

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**Session Classification:** Session XXIX

**Track Classification:** Surface, Interface and Thin Films