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MF-Superimposed Reactive HiPIMS for Deposition of ZnO:Al

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Transparent conducting oxides (TCOs) play an important role in many applications like photovoltaics. Besides well known ITO one very promising material is aluminium doped zinc oxide (AZO). Besides conventional reactive sputtering, deposition with HiPIMS offers the chance for significant modification of the resulting film properties.
This paper focuses on the film deposition of AZO films using reactive HiPIMS superimposed with mid-frequency sputtering from metallic aluminium doped zinc target. The process parameters as well as the current voltage characteristics of the HiPIMS process are investigated and the influence on the resulting properties is shown. As reference reactive mid-frequency is used.
The pulse sequence, like frequency of the MF pulses and the length of HiPIMS pulse, as well as the dependency on the average power and the peak current density in the HiPIMS pulse is studied. For reactive process control plasma emission, as well as lambda probe were used. In correlation on the preparation parameters the films are characterized by their specific resistance, morphology, and stoichiometric composition.

Keywords
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