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Plasma Atomic Layer Deposition of Zinc Oxide

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Plasma enhanced atomic layer deposition technique (PEALD) could be a new thin film growth coating technology for producing zinc oxide thin films with good optoelectronic properties, high conformity and low
defect density.
In this work zinc oxide (ZnO) is deposited using PEALD technique with two different zinc organometallic precursors with similar oxidizing precursor. The first being diethylzinc (DEZ) and oxygen (in argon
plasma) and the second precursor is methylzincisopropoxide (MZI) and oxygen (again in argon plasma). The purge and carrier gas for all these processes is argon. The substrates consist of a high aspect ratio anodic aluminum oxide (AAO) membrane to demonstrate the effectiveness of PEALD for conformal coatings
on high aspect ratio substrates.
The changes in the morphological, electrical and optical properties of these deposited films due to the change in zinc precursors, substrate temperatures and plasma powers at various oxygen flows is investigated. A post deposition annealing enhancement of these films properties is also discussed.
Further, the differences in properties is outlined between zinc oxide deposition with PEALD, thermal ALD and other chemical vapour deposition (CVD) and physical vapour deposition (PVD) techniques. This analysis helps in obtaining crucial information about PEALD parameters and its optimization for two different chemical precursors in deposition of zinc oxide and it would also give an overview about the zinc oxide properties with PEALD in comparison to other CVD and PVD techniques.

Keywords
PEALD
Zinc Oxide