

Atomic layer deposition of Al-doped ZnO thin films using dimethylaluminum isopropoxide as Al dopant

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We have deposited aluminum-doped ZnO thin films on borosilicate glass by atomic layer deposition. Diethylzinc (DEZ) and dimethylaluminum isopropoxide (DMAIP) were used as the metal precursor and the Al-dopant, respectively. Water was used as an oxygen source. DMAIP was successfully used as an aluminum precursor for chemical vapor deposition and ALD. All deposited films showed n-type conduction. The resistivity decreased to a minimum and then increased with increasing the aluminum content. The carrier concentration increased and the carrier mobility decreased with increasing the DMAIP to DEZ pulse ratio. The average optical transmittance was nearly 80 % in the visible part of the spectrum. The absorption edge moved to the shorter wavelength region with increasing the DMAIP to DEZ pulse ratio. Our results indicate that DMAIP is suitable for Al doping of ZnO films.