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Growth and Characterization of Digitally Alloyed Zinc Oxide Based TCOs AJAYA SIGDEL, SEAN SHAHEEN, University of Denver, JOHN PERKINS, DAVID GINLEY, JOSEPH BERRY, National Renewable Energy Laboratory, DU-NREL COLLABORATION — Transparent conducting oxides (TCOs) based on substitutionally doped zinc oxide and novel amorphous oxides offer the potential of high performance and low cost for organic solid-state lighting and organic photovoltaic (OPV) applications. We present studies on digitally alloyed amorphous indium zinc oxide (InZnO) with crystalline gallium doped zinc oxide (GaZnO) and zinc tin oxide (ZnSnO3). The films were grown using pulse laser deposition system with varying oxygen pressure. Alternating layers of two constituent materials are deposited with periodicity of around 5 nm. We find that the composite material has similar conductivity as the constituent species grown at similar conditions but the surface roughness and the work function are determined solely by the terminating layer. We observe that both IZO and GZO terminated stacks result in conductivity of 1.5E3 S/cm, but the surface roughness varies from 0.3 nm to 0.7 nm respectively. We also explore other possible combination of zinc based oxide materials in order to optimize the optical and the electrical properties of TCO for possible application in opto-electronic devices.

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