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Combinatorial Development of Amorphous Mixed Metal Oxide Transparent Conductors J.D. PERKINS, M.F.A.M. VAN HEST, National Renewable Energy Lab, M.I. BERTONI, Northwestern Univ., C.W. TEPLIN, J.J. BERRY, J.L. ALLEMAN, M.S. DABNEY, L.M. GEDVILAS, B.M. KEYES, B. TO, National Renewable Energy Lab, A. LEENHEER, M.P. TAYLOR, DENNIS READEY, R. O'HAYRE, Colorado School of Mines, D.S. GINLEY, National Renewable Energy Lab — We are using combinatorial approaches to optimize both amorphous In-Zn-O (a-IZO) and amorphous Zn-Sn-O (a-ZTO) transparent conductors for photovoltaic applications. Compositionally-graded combinatorial samples ("libraries") are deposited by co-sputtering onto 2"x2" glass substrates at temperatures ranging from room-temperature to 500 $^\circ$C. Three to five libraries are generally required to cover the full composition range for a binary tie-line, such as from In2O3 to ZnO. For IZO, we have found that IZO films deposited in Ar at 100 $^\circ$C are amorphous for films with 65 to 85 cation% In, with a maximum conductivity of 3000 S/cm at 80 cation% In and an RMS roughness of 0.4 nm. Subsequent sequential annealing experiments in both Ar and air show that a-IZO films are structurally, electrically and optically quite robust for anneals up to 500 or 600 $^\circ$C. For a-ZTO, the best conductivity obtained to date for an amorphous ZTO film is 200 S/cm for films grown at 400 $^\circ$C with 35 cation% Zn.

J.D. Perkins
National Renewable Energy Lab

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