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Investigation of stability issues of TCO barrier layers for CIGS devices during damp heat and dry heat exposures RAJALAKSHMI SUNDARAMOORTHY, INGRID REPINS, DAVID ALBIN, JOHN PERN, XIAONAN LI, TIM GESSERT, THOMAS GENNETT, National Centre for Photovoltaics, National Renewable Energy Laboratory — The reliability of In_2O_3:SnO_2 (ITO) and In_2O_3:ZnO (IZO) as barrier layers for $CuInGaSe_2$ (CIGS) solar cells has been investigated. NREL's high-efficiency CIGS devices are prepared using a three-stage process for the CIGS layer, and insulating ZnO and ZnO:Al as the (bi-layer) transparent conducting oxide (TCO) buffer and conducting layers, respectively. These CIGS devices are processed to explore the effectiveness of barrier layers of ITO and IZO sputtered at room temperature and at various temperatures. Devices are exposed to damp heat at 85^{o}C and 85% relative humidity (RH) and dry heat conditions (85^{o}C/$\sim$0% RH). Some cells are also tested under 1-sun illumination and open-circuit voltage bias. Optical, electrical, structural, and imaging analyses are used to characterize the samples periodically before and after the exposures. Surface depth profiling and relative concentration of the elements present are analyzed using XPS. Results of these stability studies will be discussed. This abstract is subject to government rights.

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