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Degradation of CIGS Devices Studied using Controlled Moisture Ingress RAJALAKSHMI SUNDARAMOORTHY, JOHN PERN, JIAN LI, TIM GESSERT, National Renewable Energy Laboratory, NATIONAL CENTRE FOR PHOTOVOLTAICS TEAM — The damp heat (DH) study at 85 ° C and 85% relative humidity of unencapsulated standard CIGS devices fabricated at NREL exhibited various degradation modes. In the initial 20 h of exposure there is a steep decrease in efficiency, followed by a gradual decrease until 1000 h. The devices in this study were subjected to controlled moisture ingress. Periodic light and dark current-voltage (JV), capacitance-voltage (CV) measurements were carried out before, during, and after the course of exposure. Initial trends in CV and JV data show that the decrease in the device performance correlates to the degree of degradation of the TCO and the buffer layer during the first 20 h of exposure. However, from 20-100 h of exposure the abrupt changes in CV and decrease in Voc suggest the moisture penetration deeper into the junction which might alter junction interface. This paper attempts to correlate the JV and the CV data to understand the degradation mechanism during the initial hours of DH exposure in CIGS devices.

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