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Effects of Iridium interfacial nanolayers on stability and barrier hights of TCO/Si nano-holes Solar cell structures BED SHARMA, MOHEMAD BOUANANI, University of North Texas — There is still a significant gap between currently achieved efficiencies and theoretical one. A fundamental understanding of physico-chemical and electronic properties as well as tuning and control of transparent conducting oxides (TCOs) and nano-structured semiconductor absorber material interfaces is critical. One of the many issues is the suspected formation of silicon oxides due to transport of oxygen from TCO to silicon that degrades the effectiveness of light generated charge transfer which eventually degrades final efficiency of solar cell. The fabrication of 3-D nano-holes in Si was obtained by electrochemical etching through anodic nano-porous alumina. The nano-porous alumina was prepared by depositing thick 1micrometer aluminum layer on RCA cleaned Si samples, annealing in Ar and using hard anodization process. One to few mono-layers of Ir were inserted at the TCO/Si interfaces to block the depletion of oxygen to stabilize the interface and tune its barrier height. Both ITO and ZnO were used as TCOs. The effect of Ir on the band alignment at these interfaces is evaluated by Ultraviolet Photoelectron Spectroscopy (UPS). The interface stability and chemical nature is evaluated by X-ray Photoelecton Spectroscopy (XPS).

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