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Investigation on Photoelectric Behavior of Metal-Insulator-Semiconductor Structure Based on Titania Nanotubes Arrays LILI WANG, EUGEN PANAITESCU, Northeastern University, CHRISTIAAN RICHTER, Rochester Institute of Technology, LATIKA MENON, Northeastern University — Titanium dioxide (TiO_2) has attracted great interest as an inexpensive, earth-abundant and environment-friendly anode material for next generation photovoltaic devices and the metal-insulator-semiconductor (MIS) concept is one of the most promising approaches for improving solar cell cost effectiveness (in $/W). We investigated hybrid MIS structures of semiconducting ordered titania nanotube arrays integrated with insulating iron oxide or copper oxide layers and metallic copper. The morphological and structural properties of the samples were analyzed by scanning and transmission electron microscopy, energy-dispersive X-ray spectroscopy with elemental mapping, and X-ray diffraction. The nanotubular morphology represents a step change from the current thin film approach, providing significantly larger surface area while facilitating the charge separation and electron transport. Photoelectric behavior of the new structures was estimated by transient response, quantum efficiency and spectral response, and a solar simulator was used for recording the photovoltaic response.

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