Title:	Strategy to Improve the Photovoltaic Performance of Si/CuO Heterojunction via Incorporation of Ta2O5 Hopping Layer and MXene as Transparent Electrode
Authors:	Venkatesan, Ananth (/jspui/browse?type=author&value=Venkatesan%2C+Ananth)
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Abstract:	Recently, metal oxide semiconductors, especially copper oxides, have engrossed researchers in the domain of solar cells due to their good optoelectronic properties. The present study reports the development of a heterojunction of CuO and Ta2O5 on pyramidal Si decorated with a thin MXene coating as a transparent conductive electrode. Further, the impact of annealing ambient on the crystalline quality and phase selectivity of the as-deposited CuxOy film has also been investigated. The as-designed Si/Ta2O5/CuO/MXene heterostructure shows improved efficiency as compared to the counter device without a Ta2O5 passivation layer by 109 factors. The superiority of the as-designed heterojunction has been examined in terms of short-circuit current density of −10.5 mA/cm2 and photoconversion efficiency of ∼1.47%, respectively. Therefore, the work emphasizes the importance of the combination of n-Ta2O5 and p-CuO film as the wide- and low-band-gap materials for the future low-cost solar cell compatible with the Si process line technology.
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