Changes in local electronic structure on the Si/TiO2/Fe2O3 photo-catalysts

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The design of efficient photo-electrodes for conversion of solar energy to renewable fuels like hydrogen and oxygen through overall photo/electrochemical water splitting reaction is presented in this study. We fabricated Si nanowires (Si-NWs) and decorated them with TiO2 and Fe2O3 to study the photo-electrochemical performance and the changes in the local electronic structures of the electrodes. Photo-electrochemical performance of the electrodes was studied with and without bias condition whereas changes in the electronic structure of the as-synthesized electrodes were studied using X-Ray absorption (XANES) and resonant valence-to-core X-Ray emission (vc-XES) spectroscopic techniques. The latter provides an element and orbital selective band gap. This study presents the changes in the local electronic structure of mesoporous TiO2 and TiO2/Fe2O3 coated Si NWs. We present XAS and vc-XES data collected on the bare TiO2, bare Fe2O3 and TiO2/Fe2O3 coated Si NWs at both Ti and Fe K-edge.


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