Stabilizing inorganic photoelectrodes for efficient solar-to-chemical energy conversion

Syed Mubeen\textsuperscript{a,b}, Joun Lee\textsuperscript{b}, Nirala Singh\textsuperscript{a}, Martin Moskovits\textsuperscript{b} & Eric W. McFarland*\textsuperscript{a}

Received (in XXX, XXX) Xth XXXXXXXXXX 20XX, Accepted 2Xth XXXXXXXXX 20XX

DOI: 10.1039/b000000x

\textsuperscript{a}Department of Chemical Engineering, University of California, Santa Barbara, California 93106, USA
E-mail: ewmcfar@engineering.ucsb.edu
\textsuperscript{b}Department of Chemistry and Biochemistry, University of California, Santa Barbara, California 93106, USA

\textbf{Figure S1.} Raman spectroscopy of untreated PEDOT: PSS (blue trace) and ethylene glycol treated PEDOT: PSS (black trace). Raman spectroscopy of ethylene glycol treated PEDOT: PSS after 18 hours of HBr electrolysis is also shown (red trace). The Raman band between 1400 and 1500 cm\textsuperscript{-1} shows a slight red shift and becomes narrower after EG treatment. No change was observed in Raman spectra after HBr photolysis.
**Figure S2.** SEM image of EG-PEDOT: PSS coated n-Si anode before (a) and after HBr photolysis (b).

Inset in (b) shows high magnification SEM image of EG-PEDOT: PSS coated n-Si anode.

**Figure S3.** X-ray photoelectron spectrum of underlying silicon substrate after EG-PEDOT: PSS delamination. Prior to delamination and XPS measurements, photoelectrochemical measurements in HBr were performed at a bias of 0.6 V with respect to platinum electrode for 6 hours.
Figure S4. Photocurrent performance of PEDOT: PSS coated n-Si anode illuminated at 35 mW cm\(^{-2}\) in HBr. Ethylene glycol treated PEDOT: PSS (blue trace) showed higher photocurrents with superior stability compared to untreated PEDOT: PSS (black trace). HBr electrolysis was performed at a bias of 0.6 V with respect to platinum electrode.