Prolonged Hot Electron Dynamics in Plasmonic Au-TiO_2 Heterostructures with Implications for Solar Photocatalysis

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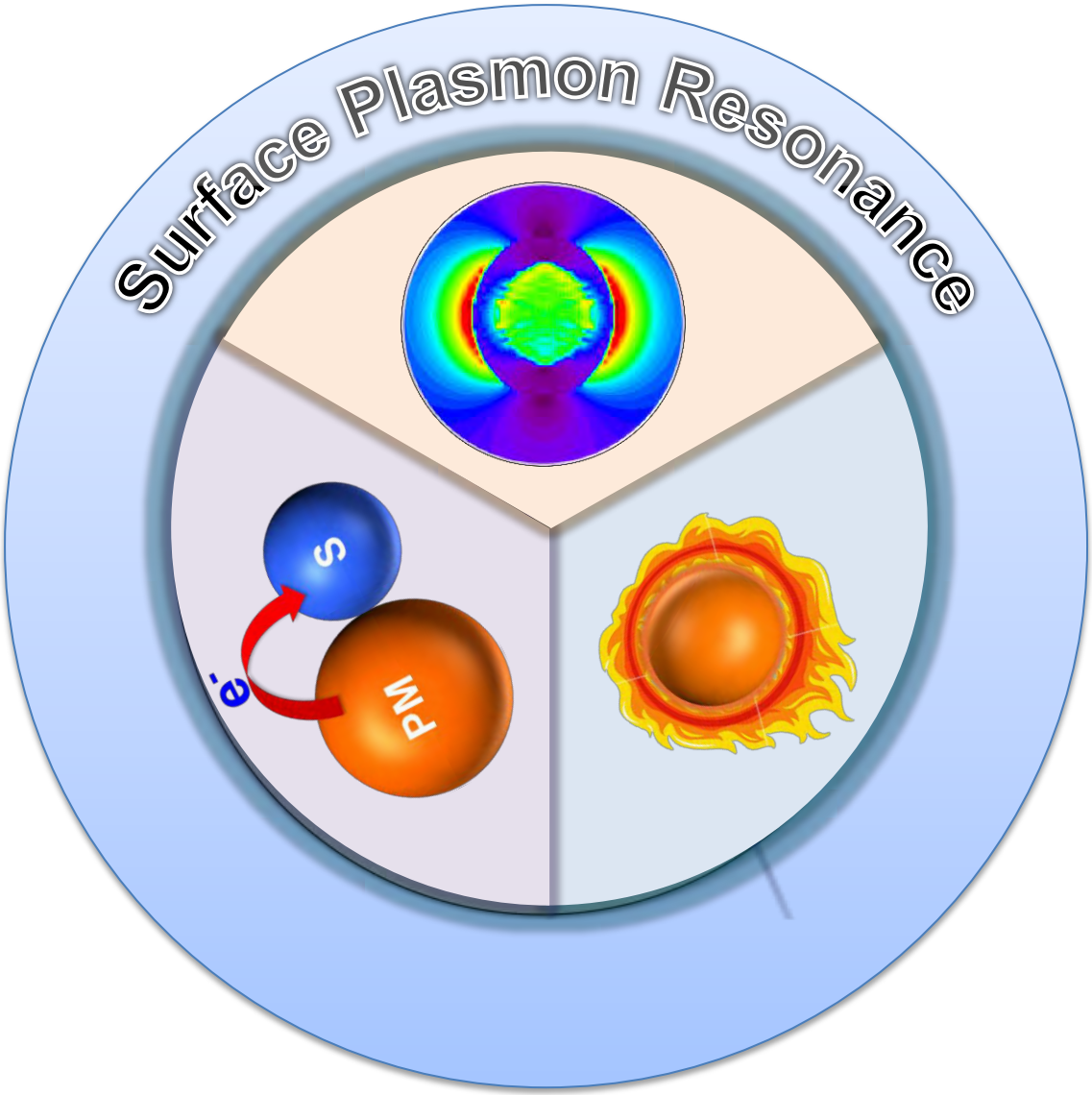
NSLS/CFN Joint Users' Meeting
Brookhaven National Laboratory
05-21-2014


Surface Plasmon Resonance
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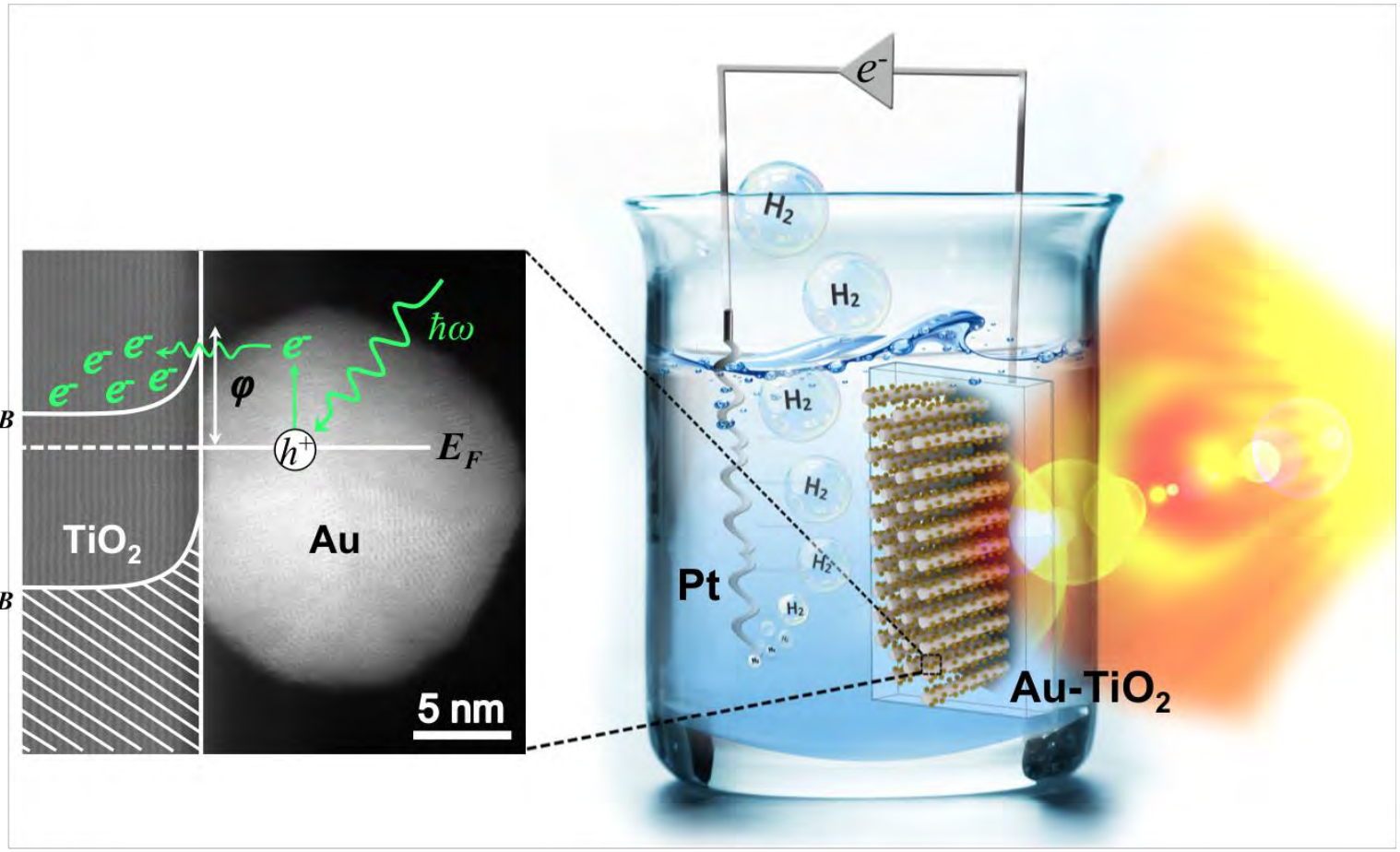
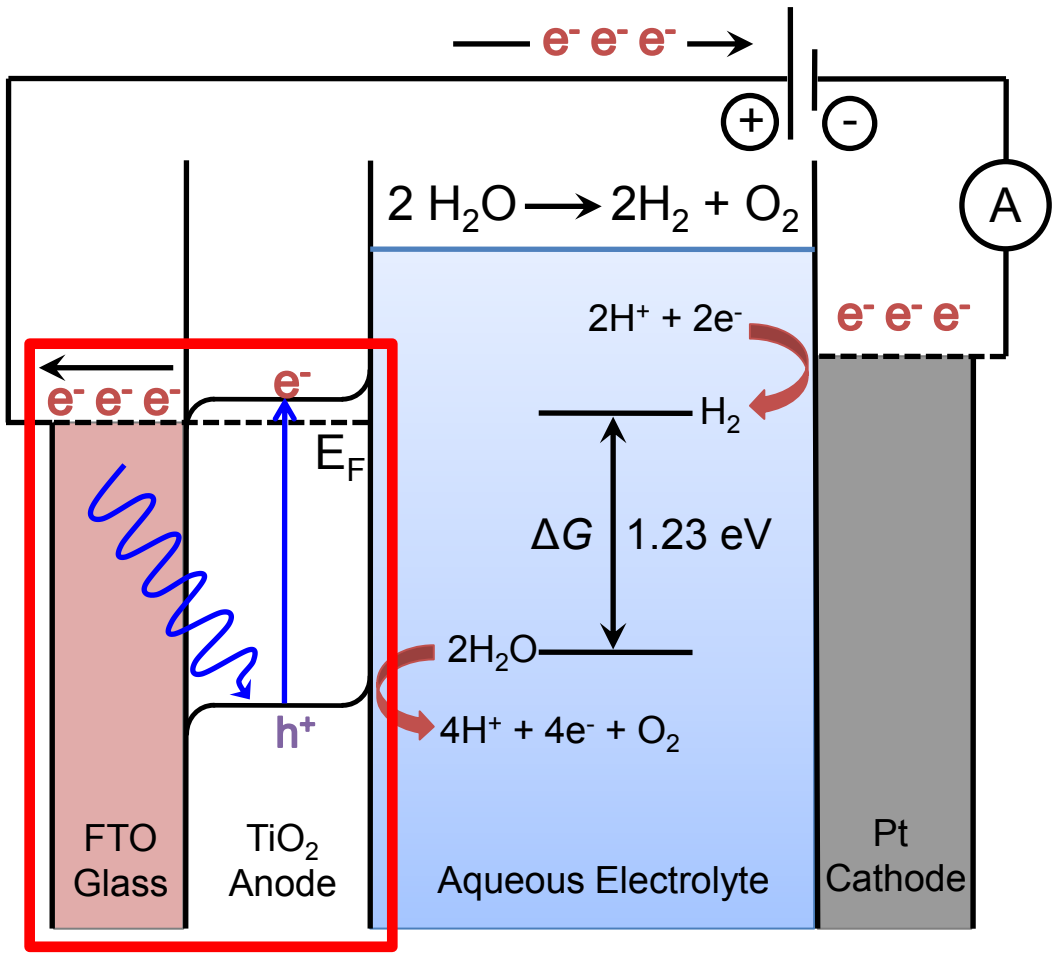
Prolonged Hot Electron Dynamics in Plasmonic Metal-Semiconductor (Au-TiO_2) Heterostructures with Implications for Solar Photocatalysis



Angew. Chem. Int. Ed., accepted

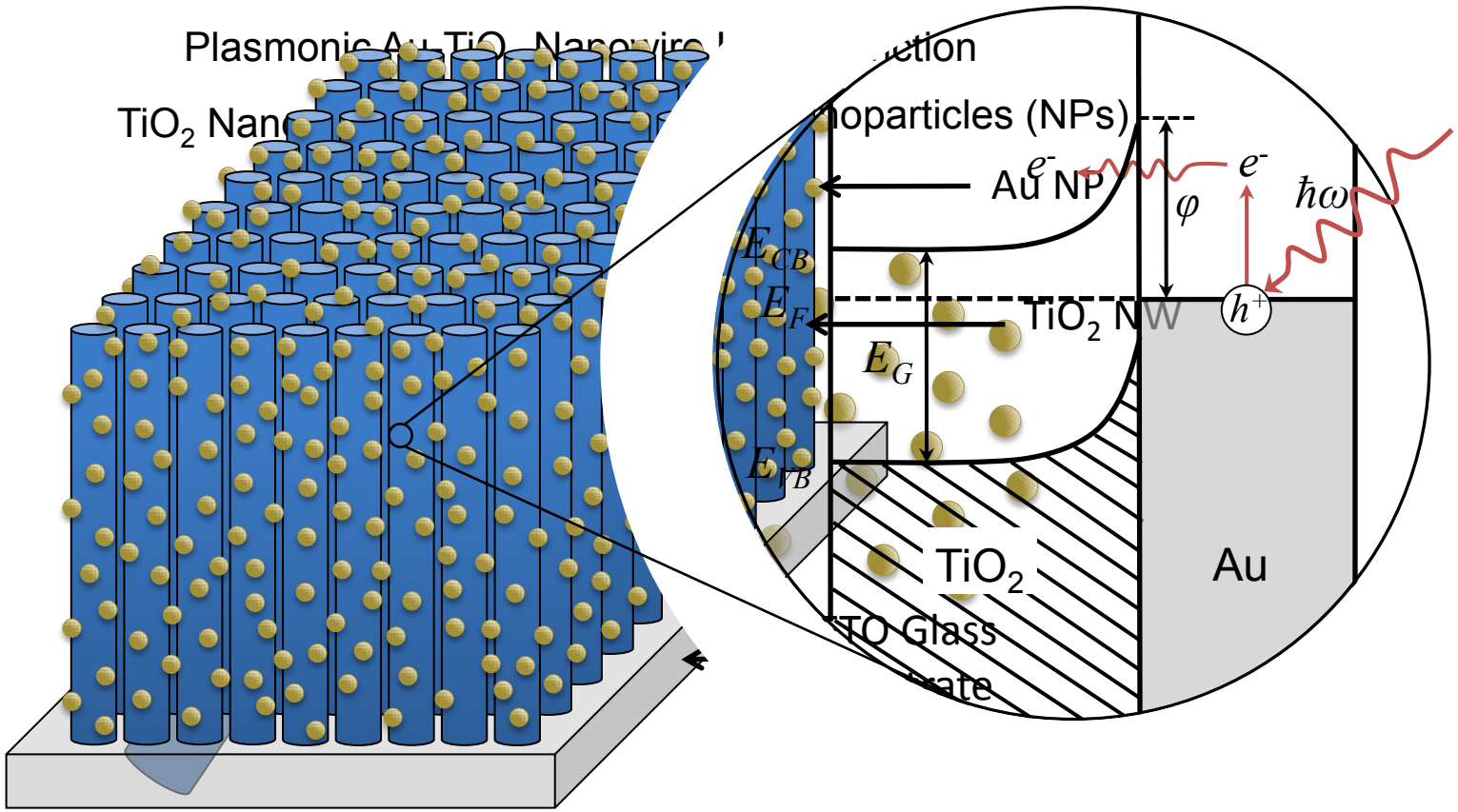
Photoelectrochemical Cell (PEC)



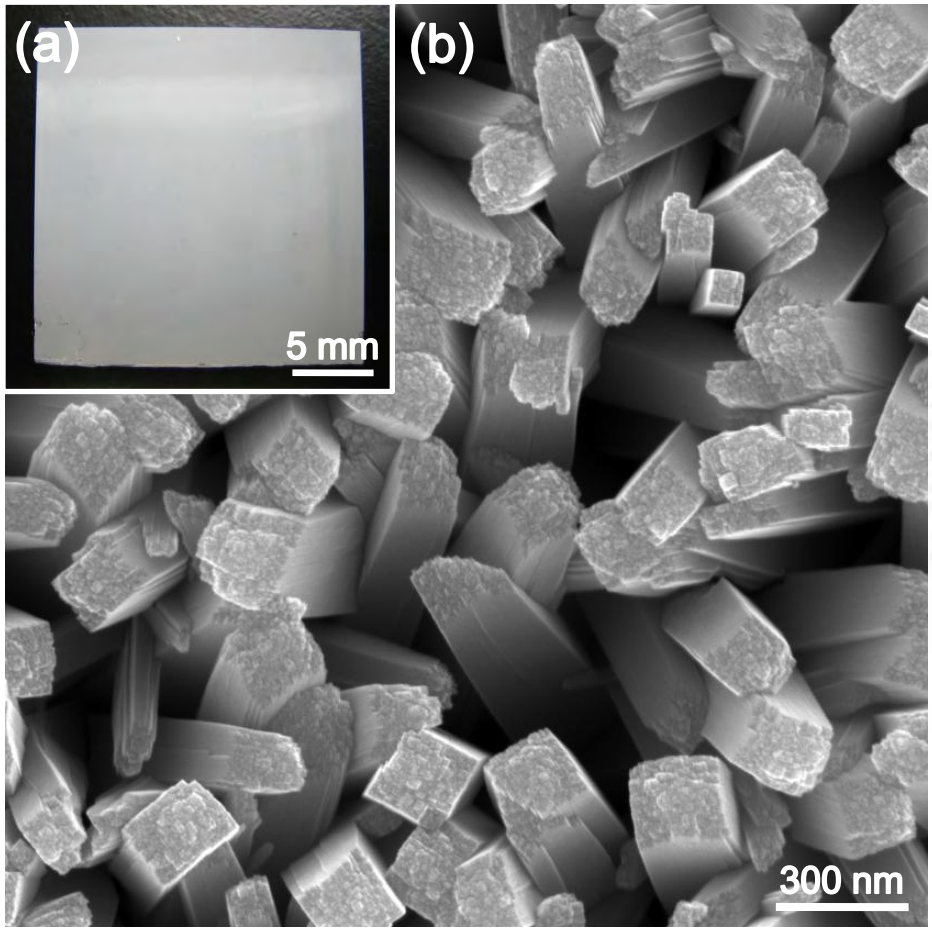
Nano Lett., 2011, 11, 3440-3446

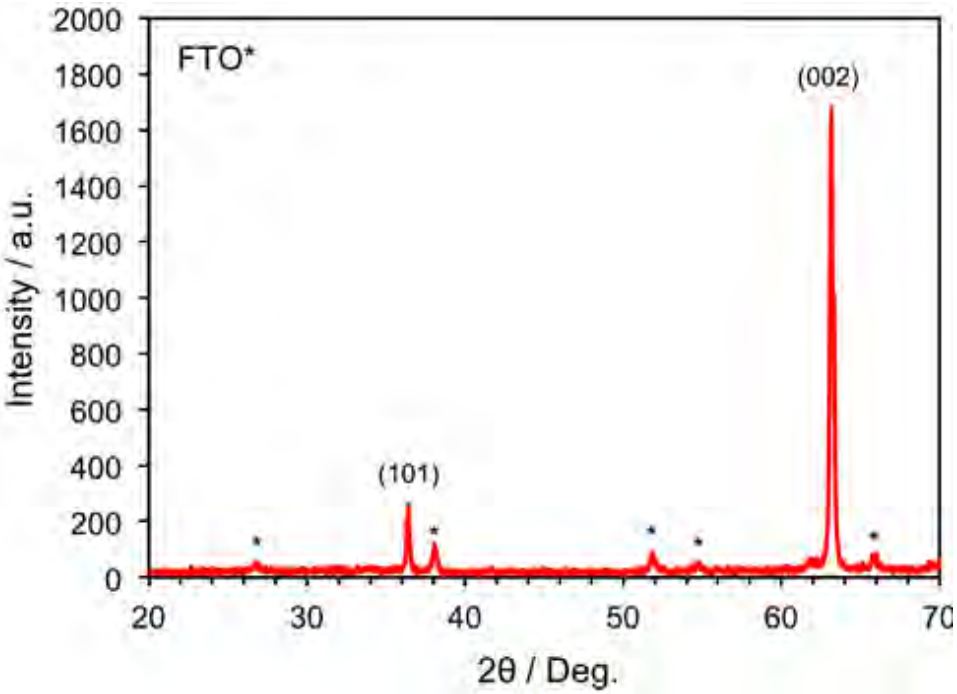
Assembling the Au-TiO_2 Interface

Plasmon-Mediated Charge Transfer (PMCT) Process

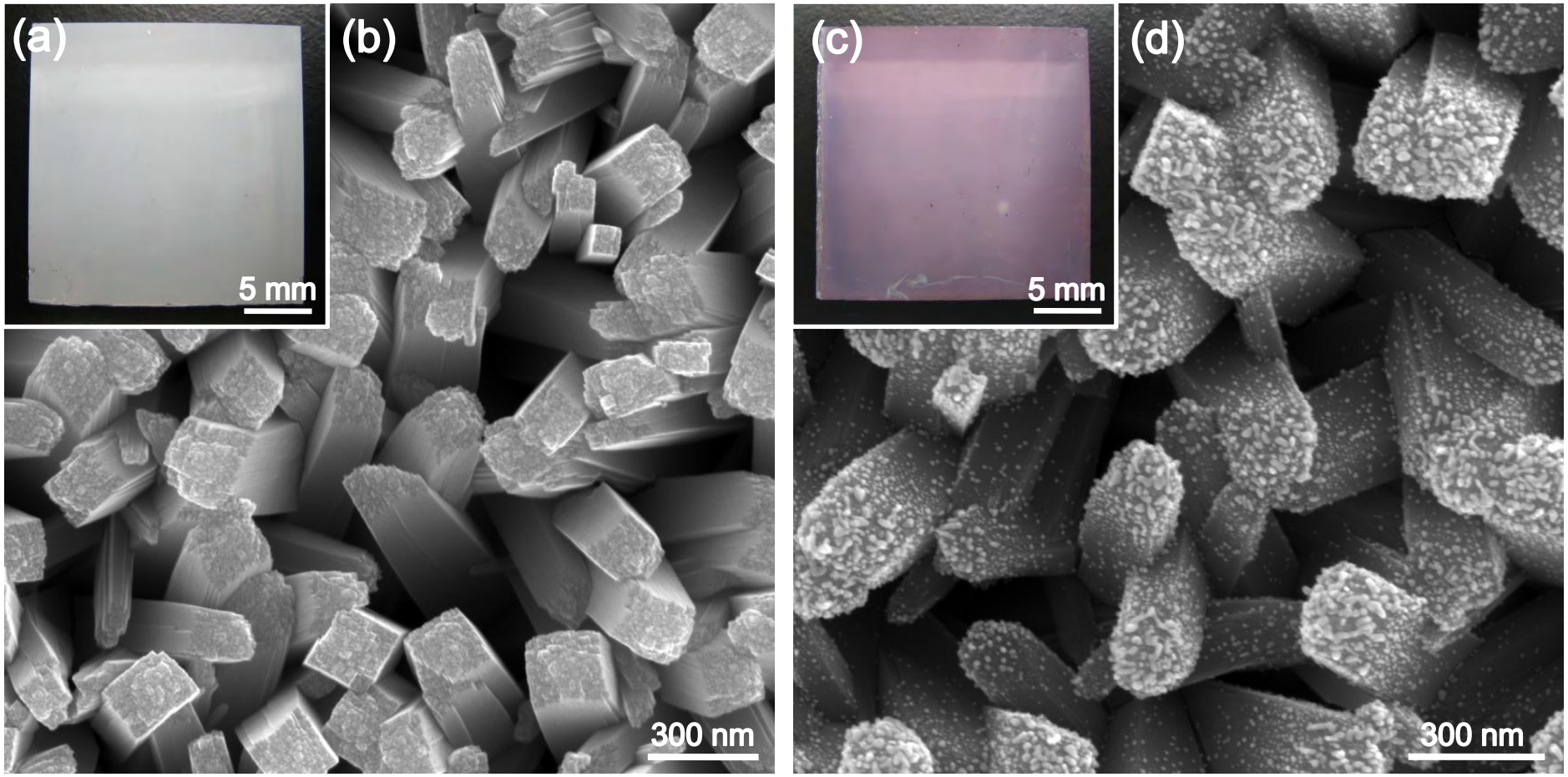


Plasmonic PEC Device Architecture

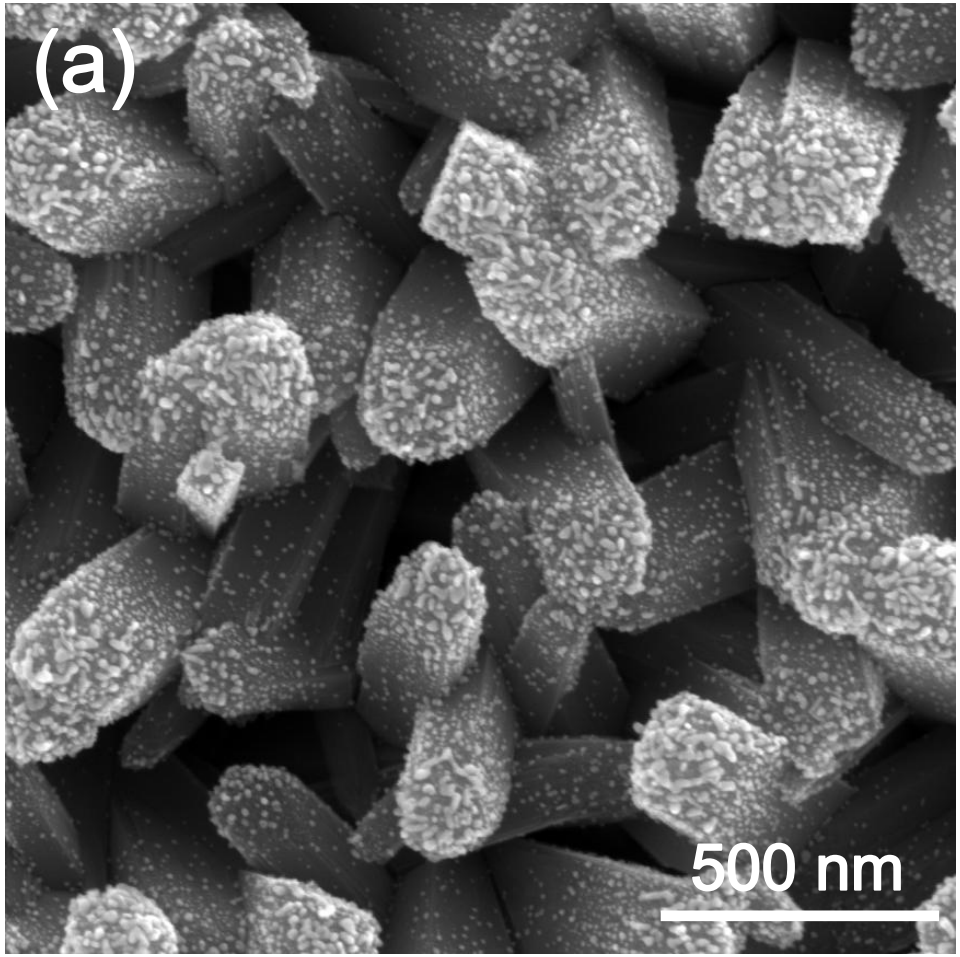


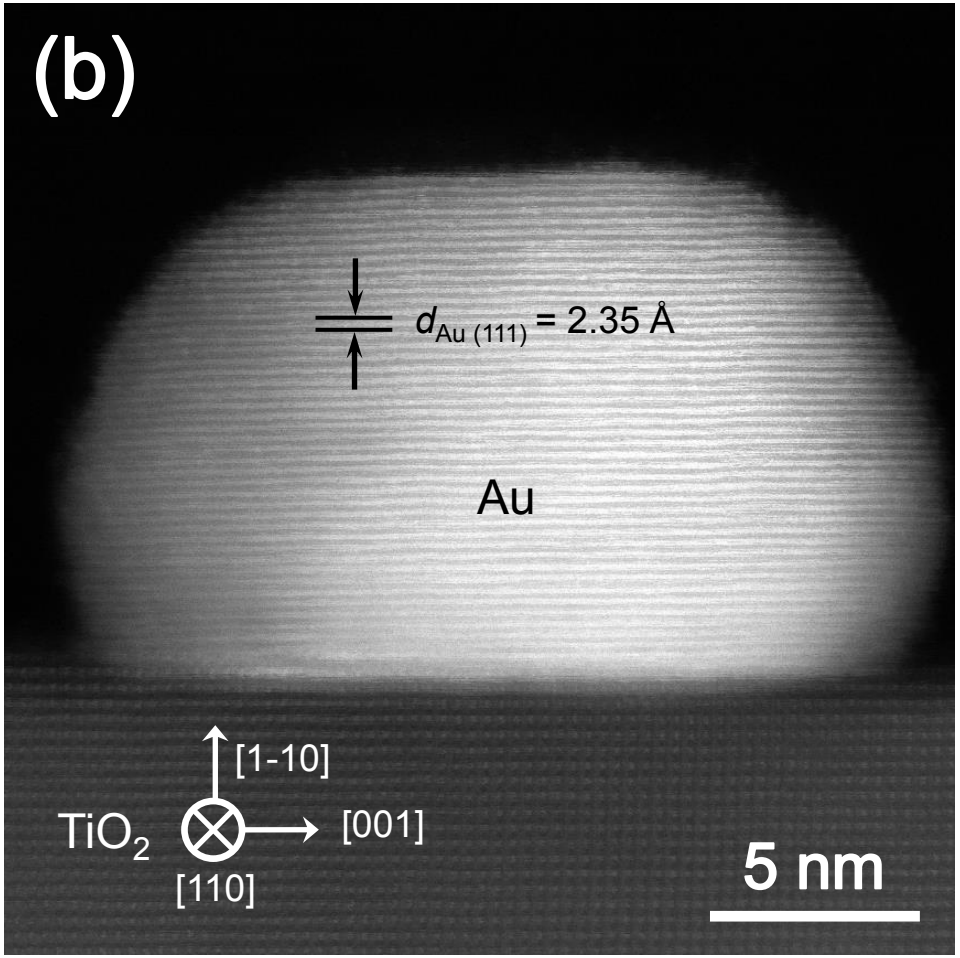


Plasmonic PEC Device Architecture

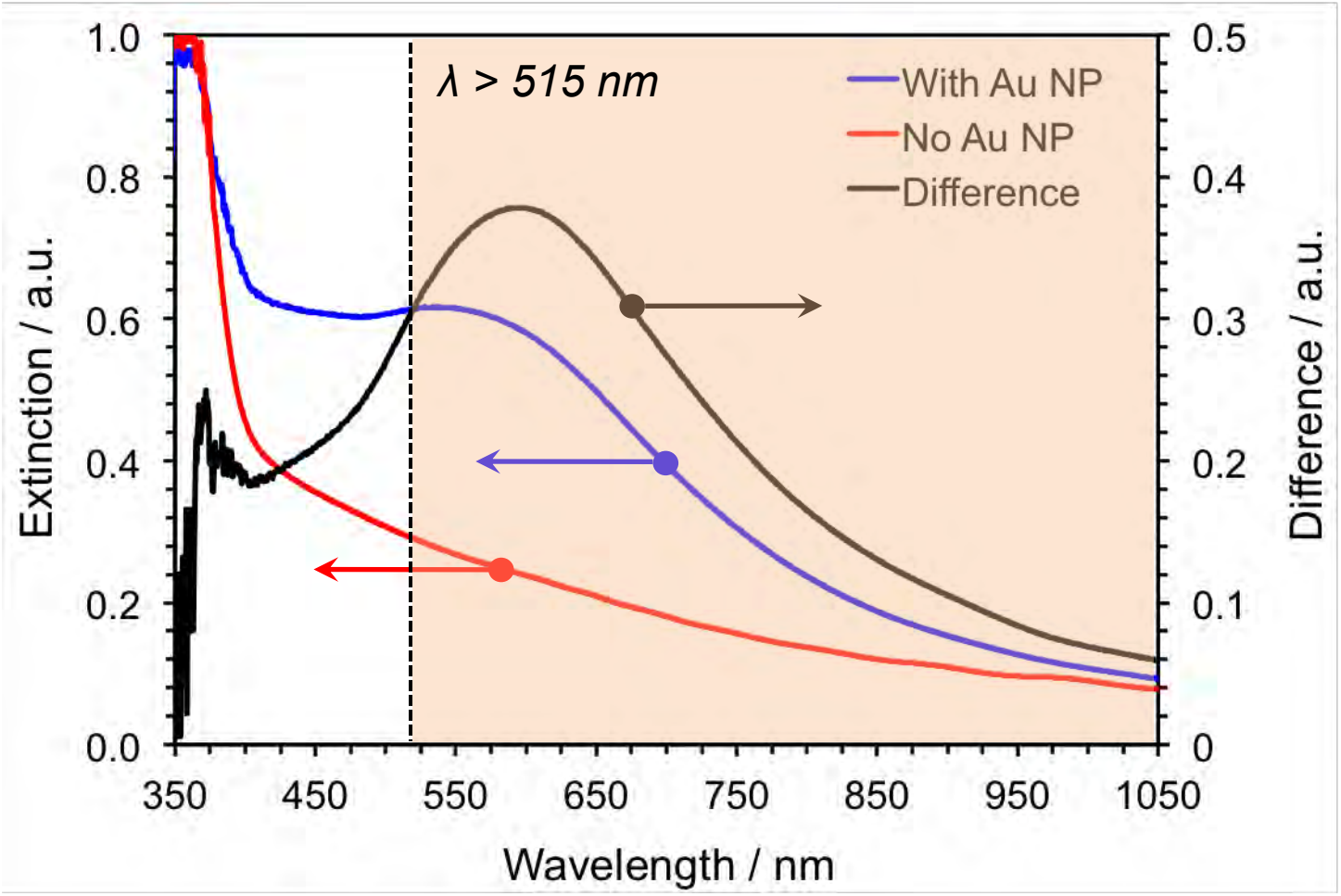


Metal-Semiconductor (Au-TiO_2) Interface

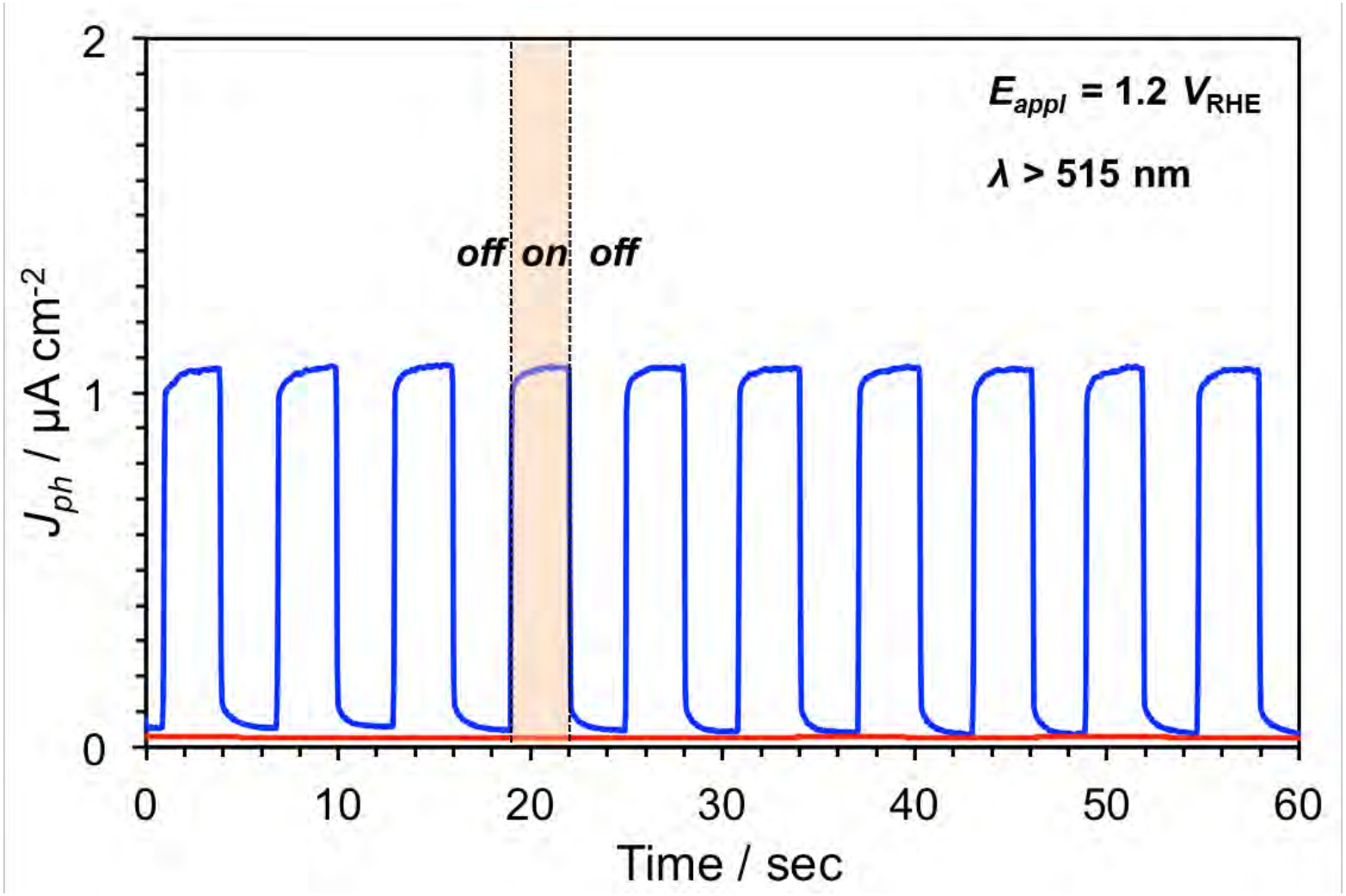




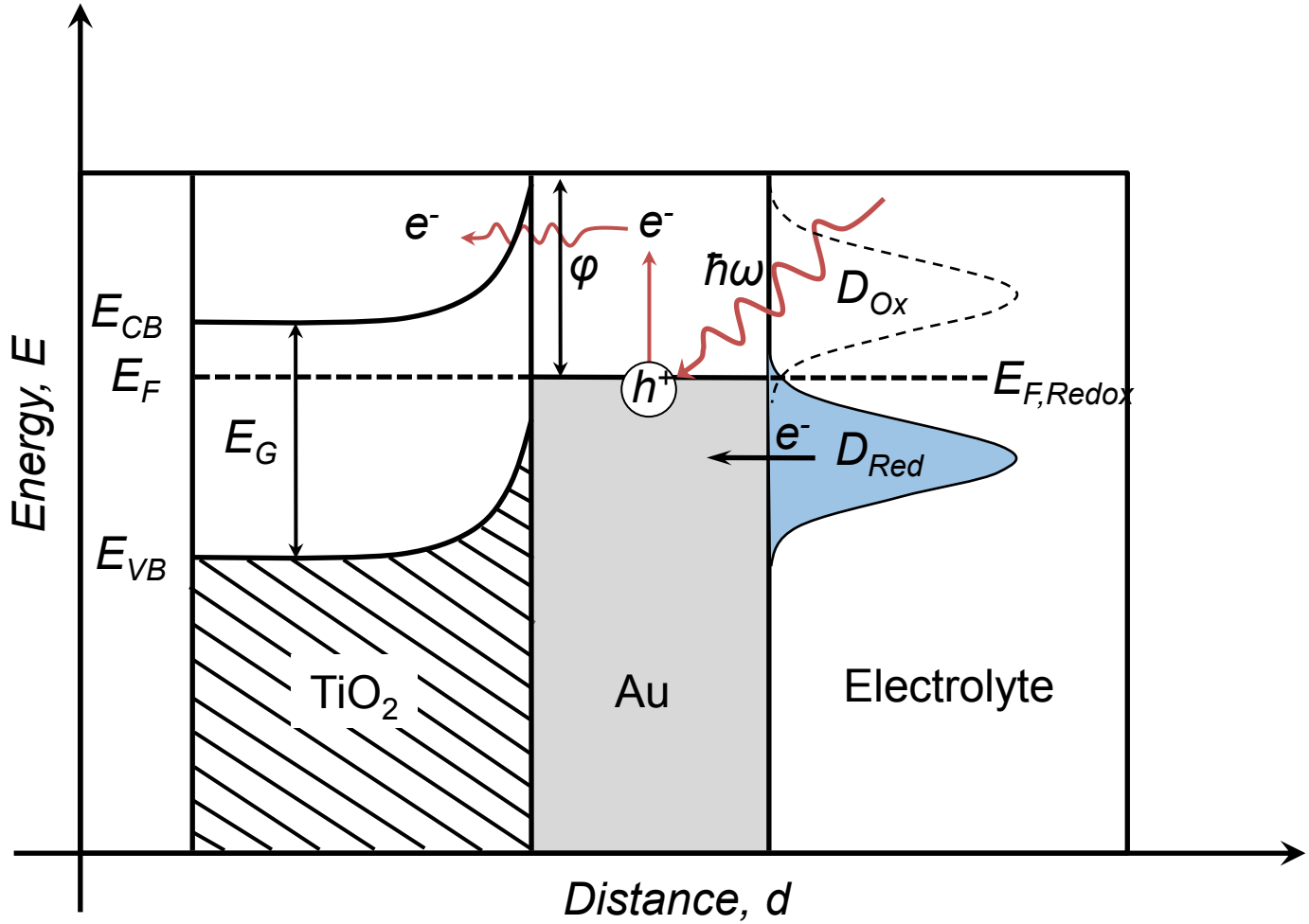
Optical Properties of Devices



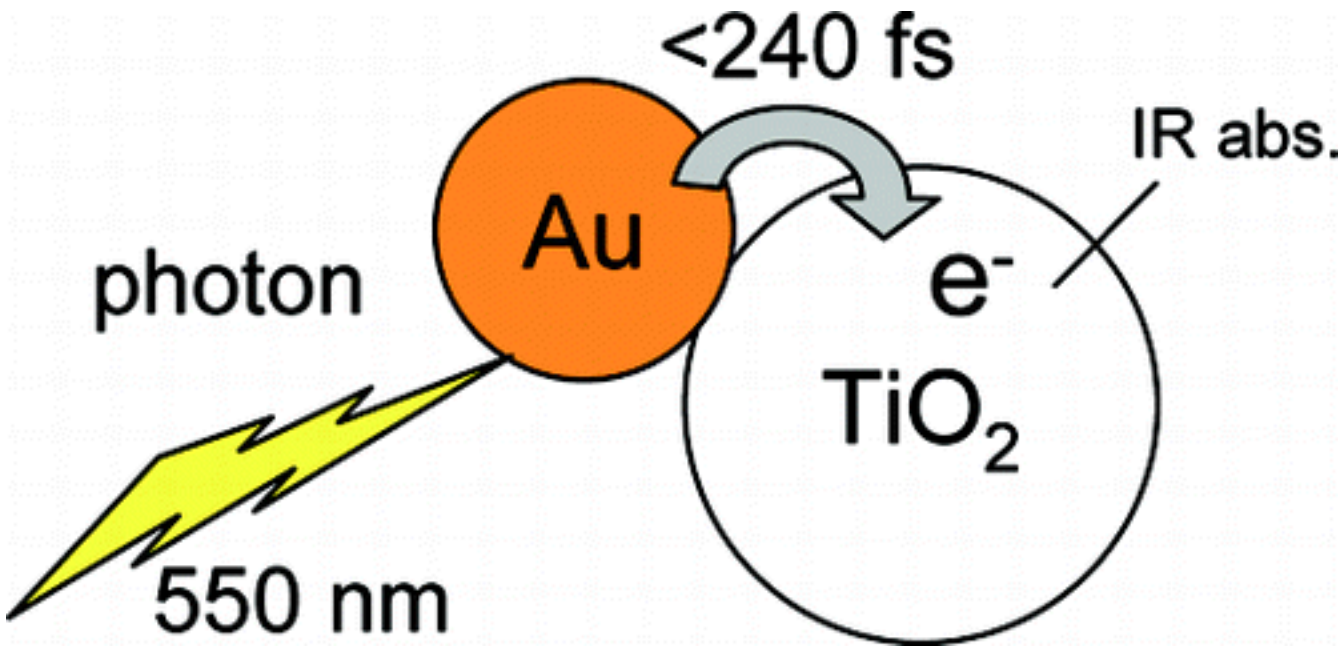
Plasmon-Mediated Charge Transfer



Proposed PMCT Process in Au-TiO_2

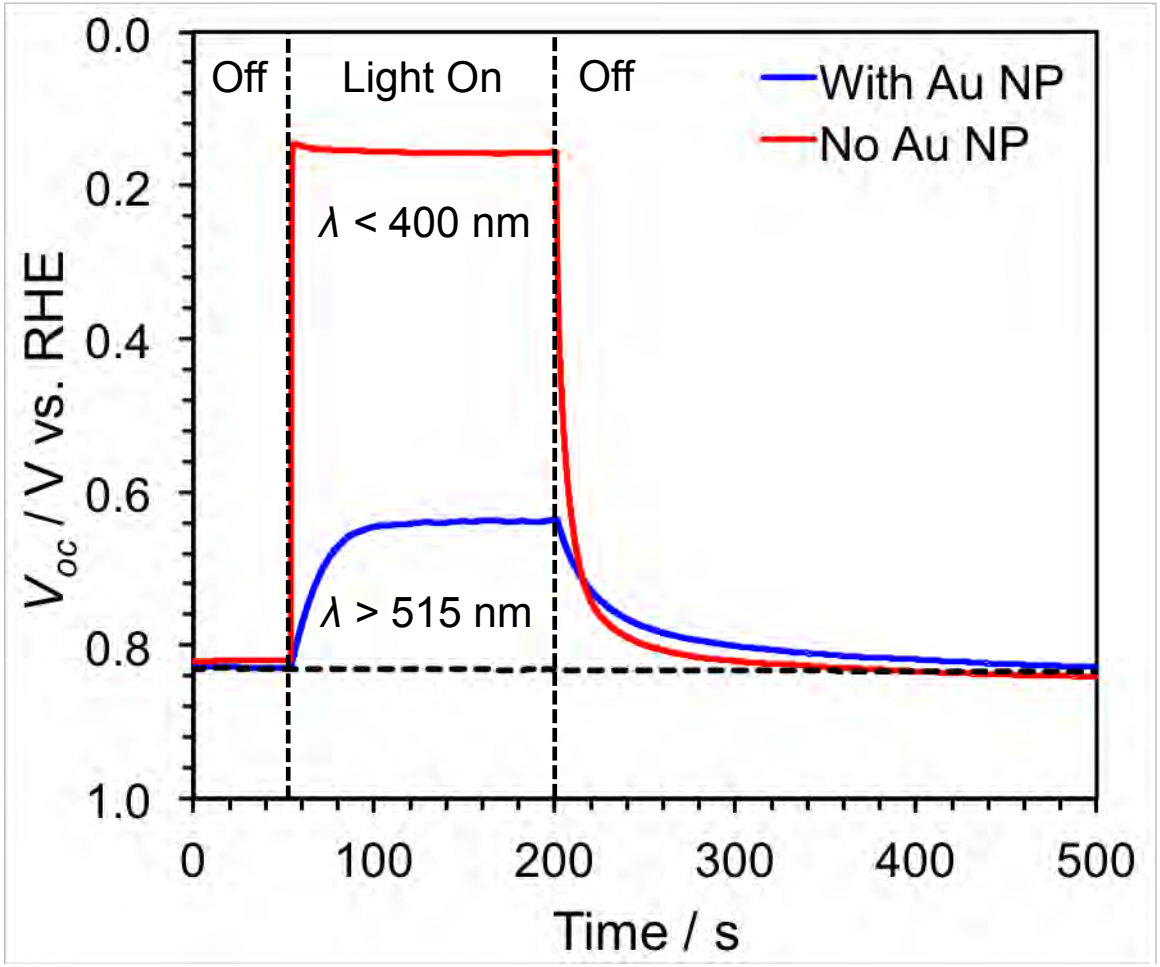


Ultrafast Timescale of the PMCT

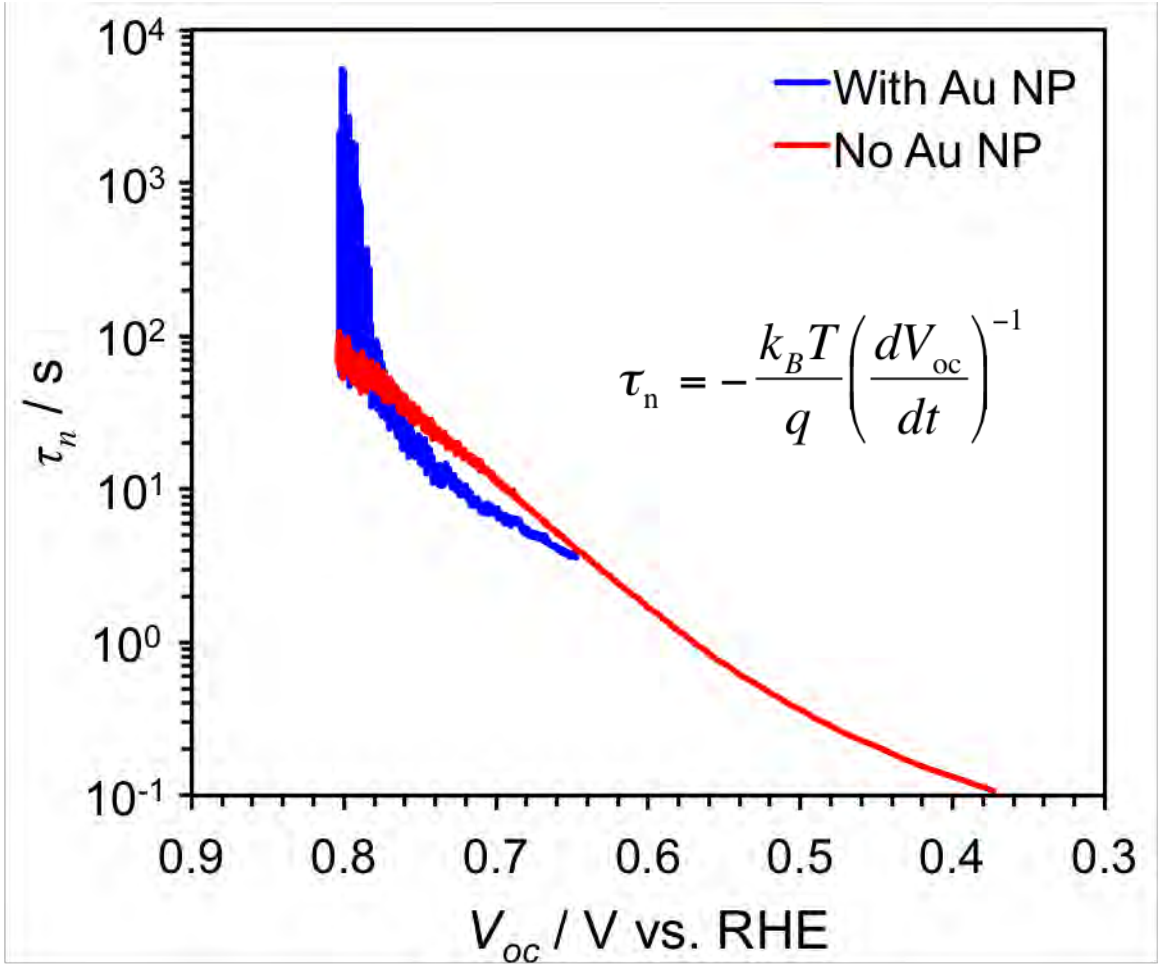


J. Am. Chem. Soc., 2007, 129 (48), 14852–14853

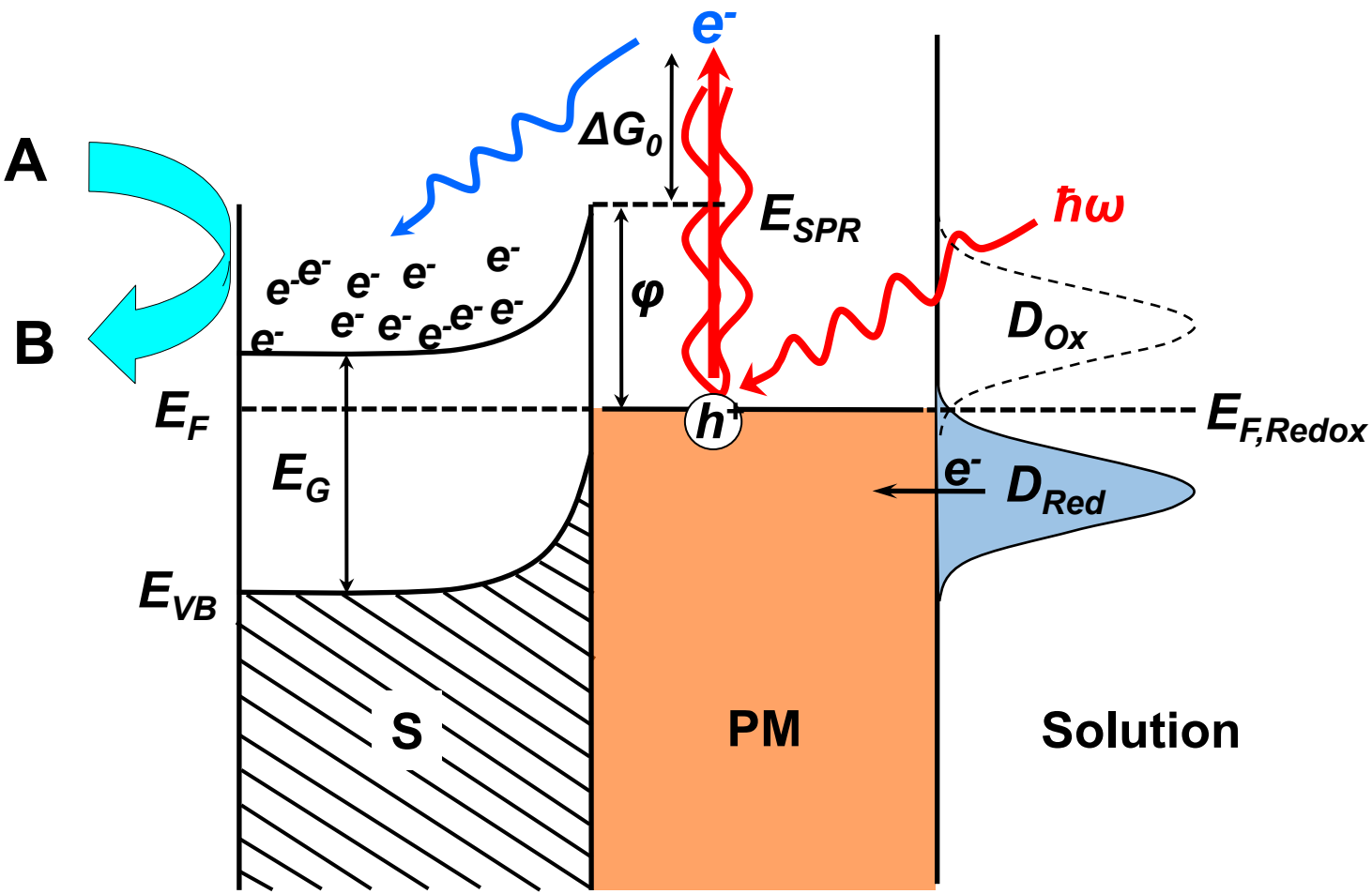
Open-Circuit Voltage (V_{oc})



Charge Carrier Lifetimes (τ_n)



Take Home Messages



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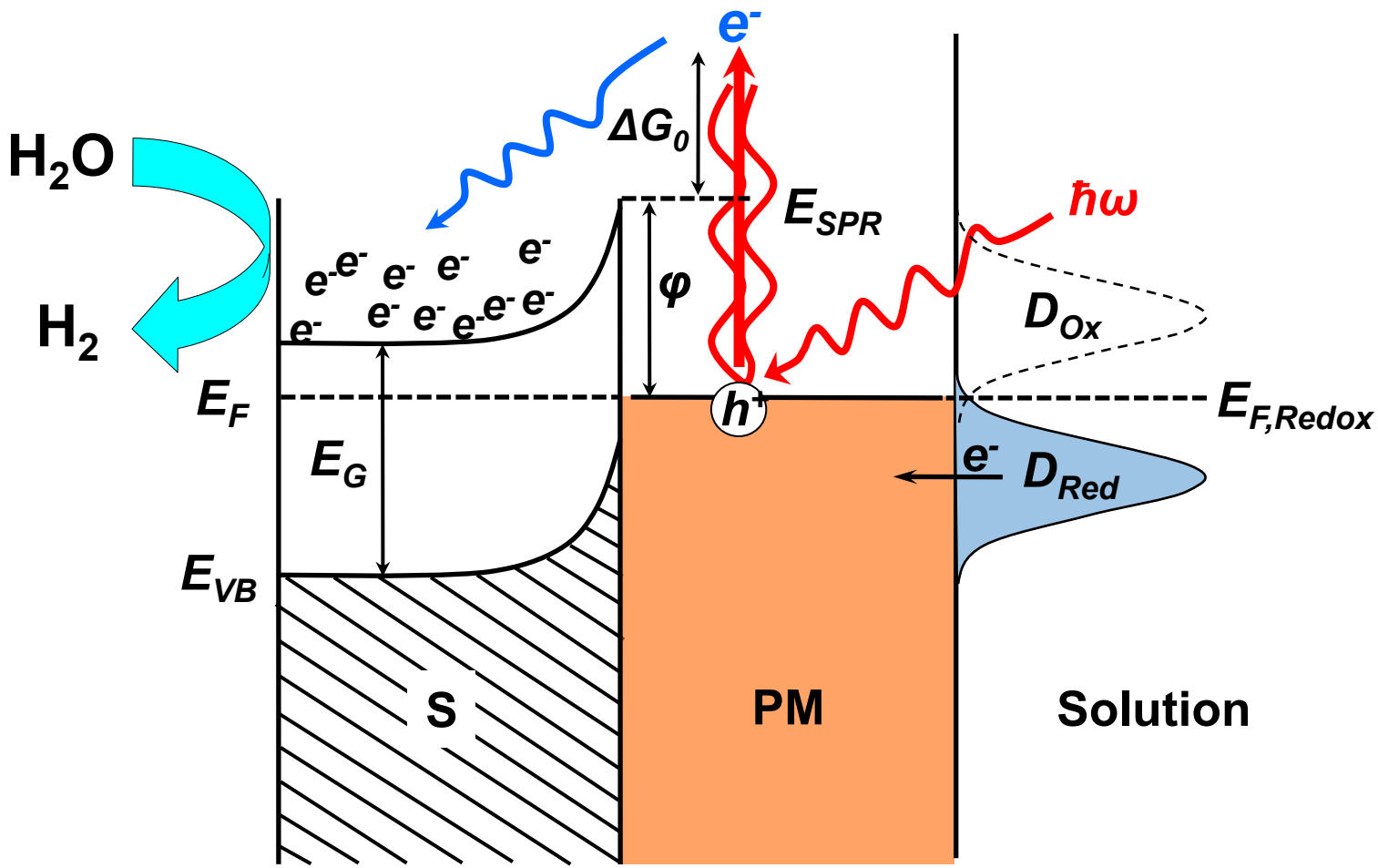
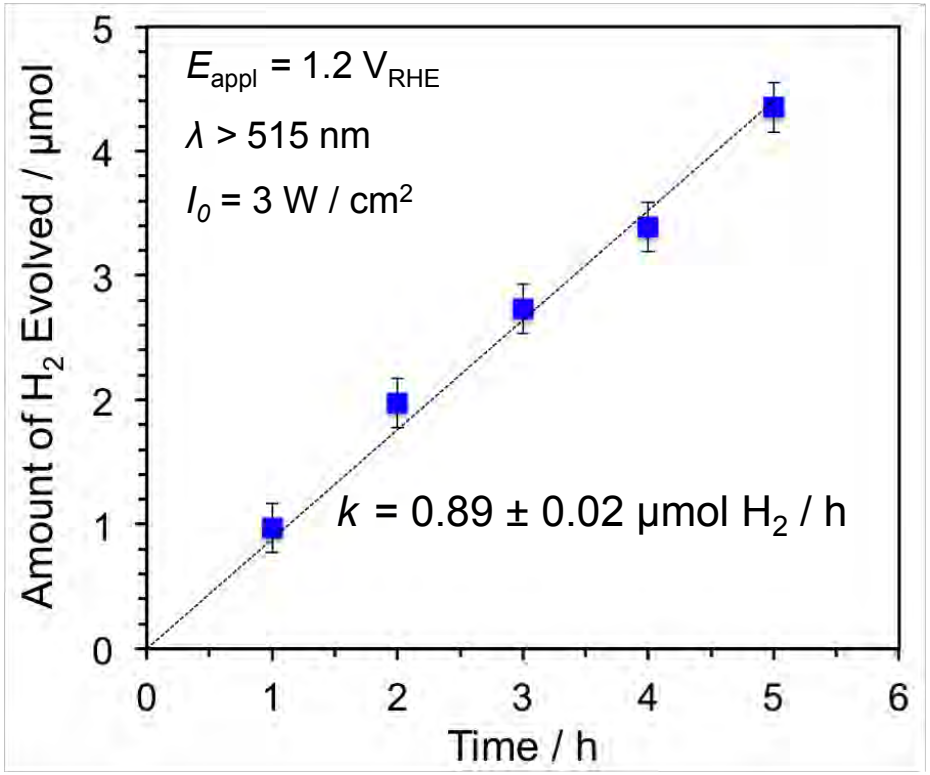
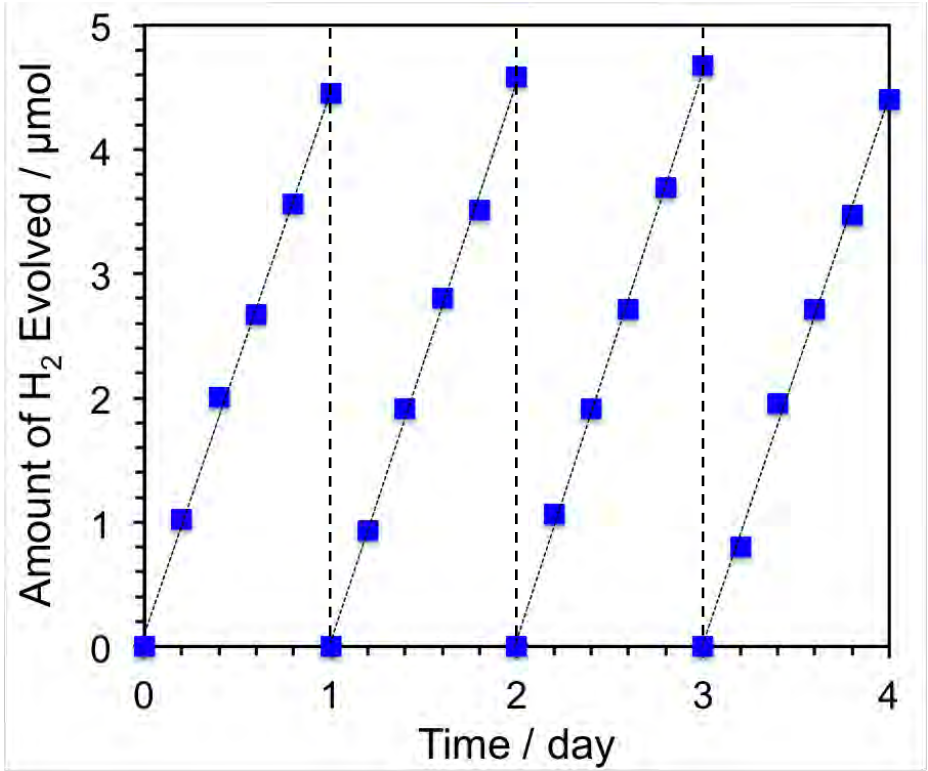


Visible-Light H_2 Production

Average H_2 Production



Photocatalytic Stability



Acknowledgements

NSF

BROOKHAVEN NATIONAL LABORATORY

User proposal # BNL-CFN-31913

Dr. Eric Stach

Dr. Aaron C. Johnston-Peck

Dr. Dong Su

CNEM Center for Nanostructured Electronic Materials

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