Supplementary Information for:

Semiconductor-to-Metal Transition in Rutile TiO_2 Induced by Tensile Strain †

Eric E. Benson‡, Elisa M. Miller, Sanjini U. Nanayakkara, Drazenka Svedruzic, Suzanne Ferrere, Nathan R. Neale, Jao van de Lagemaat, and Brian A. Gregg.

National Renewable Energy Laboratory, 15013 Denver West Parkway, Golden, Colorado 80401, United States

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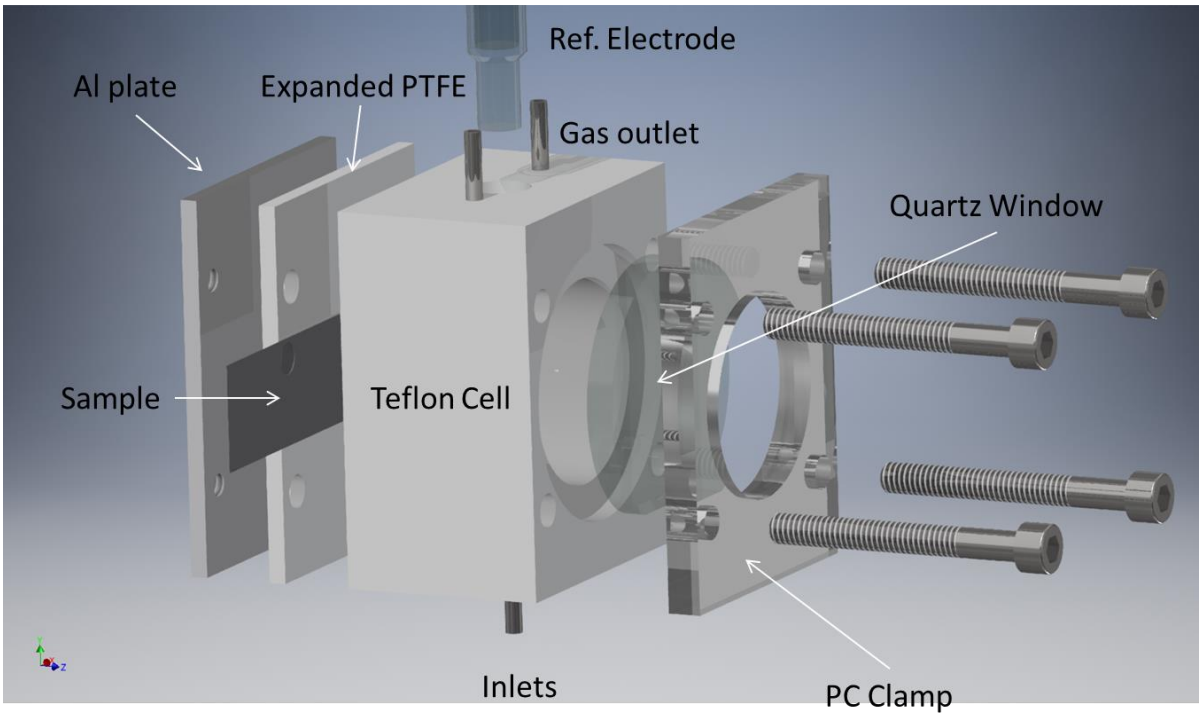


Figure S1. Schematic of the electrochemical cell used for electrochemical measurements under tensile strain.

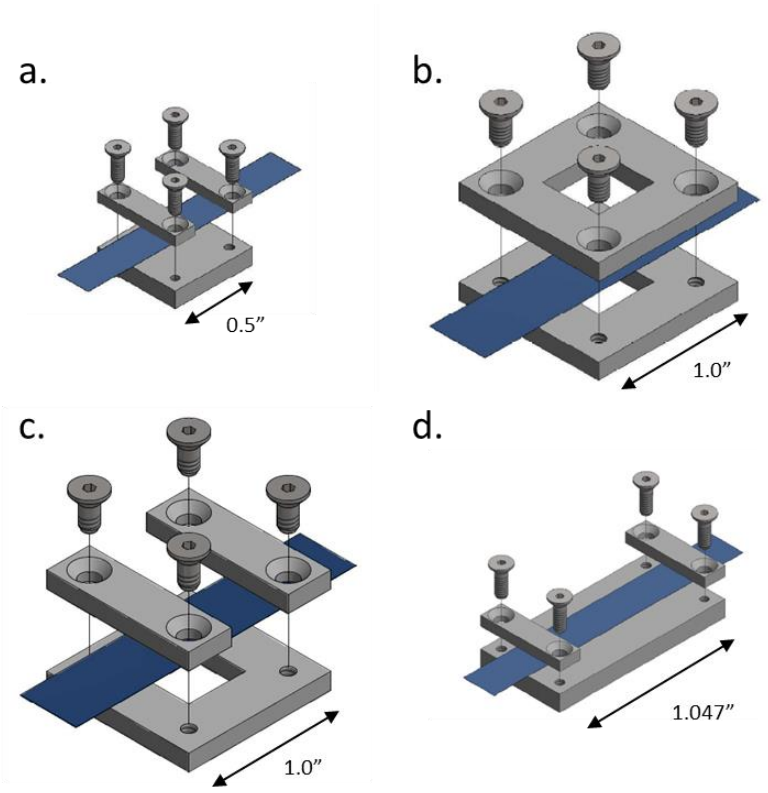


Figure S2. Schematic of the static stretch holders used for (a) XPS, (b) diffuse reflectance, (c) SEM and (d) Conducting AFM.

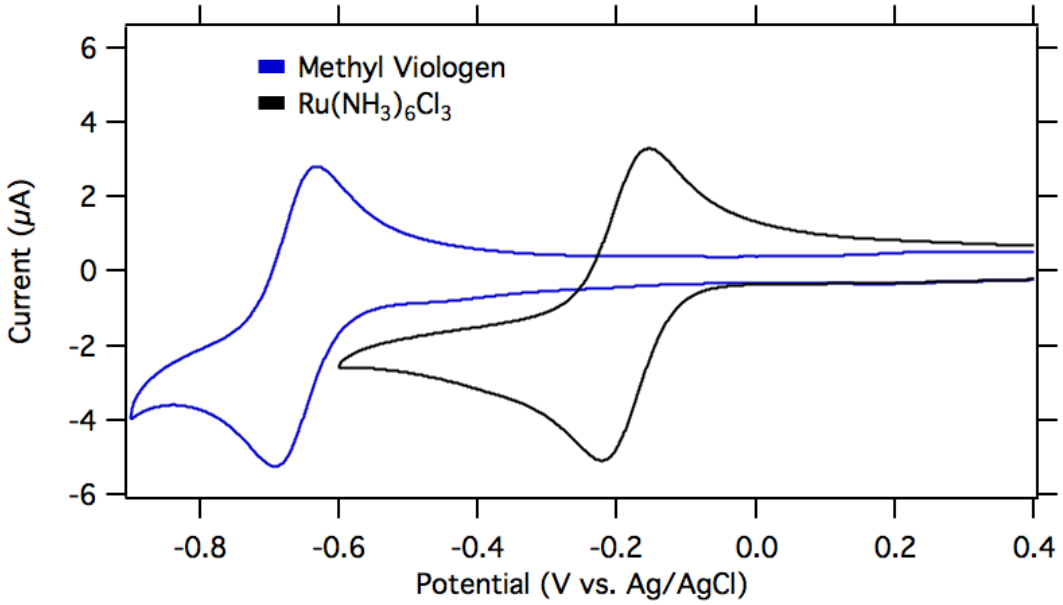


Figure S3. Cyclic voltammograms of electrochemical standards in 0.1 M phosphate buffer, Au working electrode, Ag/AgCl reference and Pt counter. Concentration of analytes is 1 mM. CVs were taken of sparged solutions immediately after strain experiments.

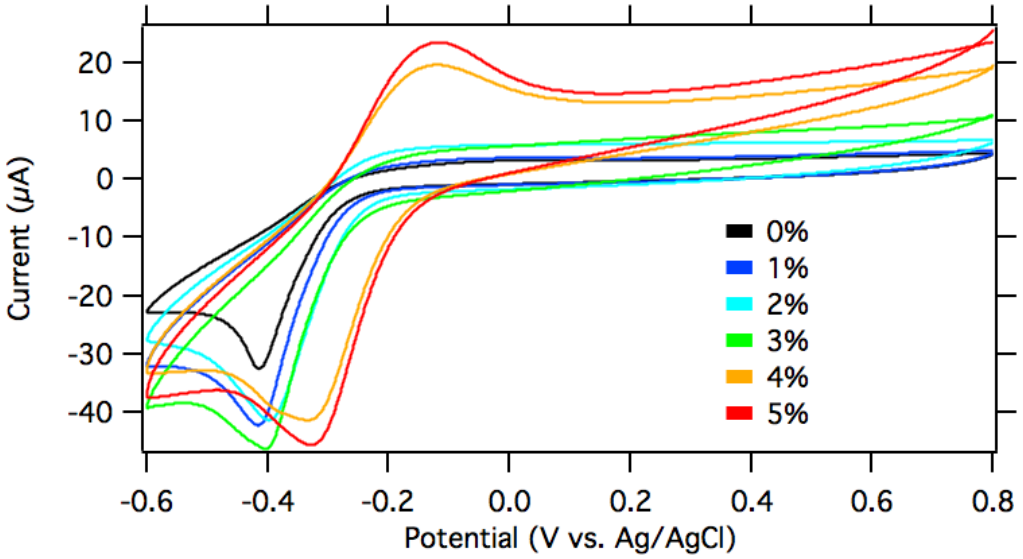


Figure S4. CVs of 1 mM ruthenium hexamine in 0.1 M phosphate buffer (pH 7) at a 100 nm TiO_2 film at 0% – 5% applied external strain at 1% strain intervals, scans were taken at 50 mV/s with Ag/AgCl reference and Pt counter electrodes.

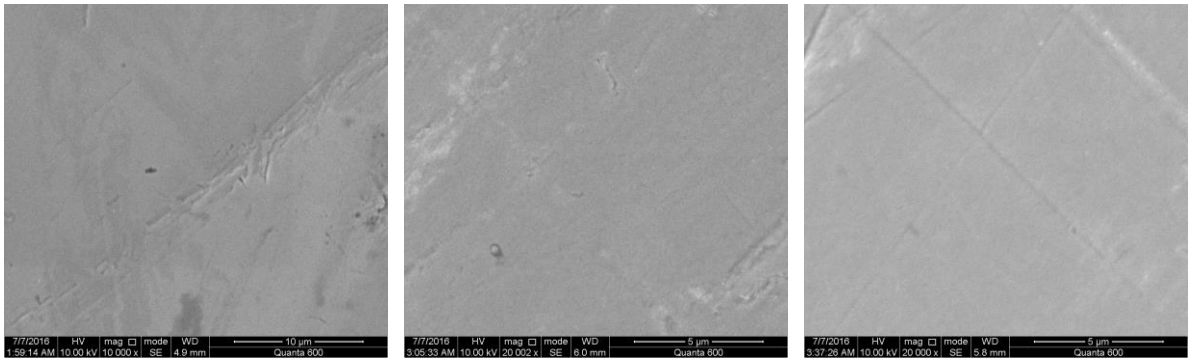
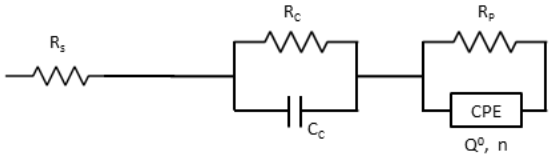


Figure S5. SEM images of polished (left), oxidized (middle), and strained 5% (right) substrates

Table S1. Model circuit and fitting parameters for strained TiO_2 films in 1mM $Ru(NH_3)_6Cl_3$ and 0.1M pH 7 phosphate buffer. EIS was measured from 100 Hz to 2 MHz at 0.0 V vs. Ag/AgCl.



Strain	R_s (Ω)	R_C (Ω)	C_C (F)	Q_0 ($S \cdot s^n$)	n	R_p (Ω)	C_{eff} (μF/cm^2)	Error
0%	34.79	268.5	1.19E-09	1.82E-06	0.8754	1.50E+04	6.50	0.02467
5%	38.73	277.5	1.17E-09	6.00E-06	0.8282	3.60E+03	14.9	0.03018
0% (Relaxed)	42.38	276.1	1.10E-09	1.84E-06	0.8614	1.55E+04	5.68	0.02916

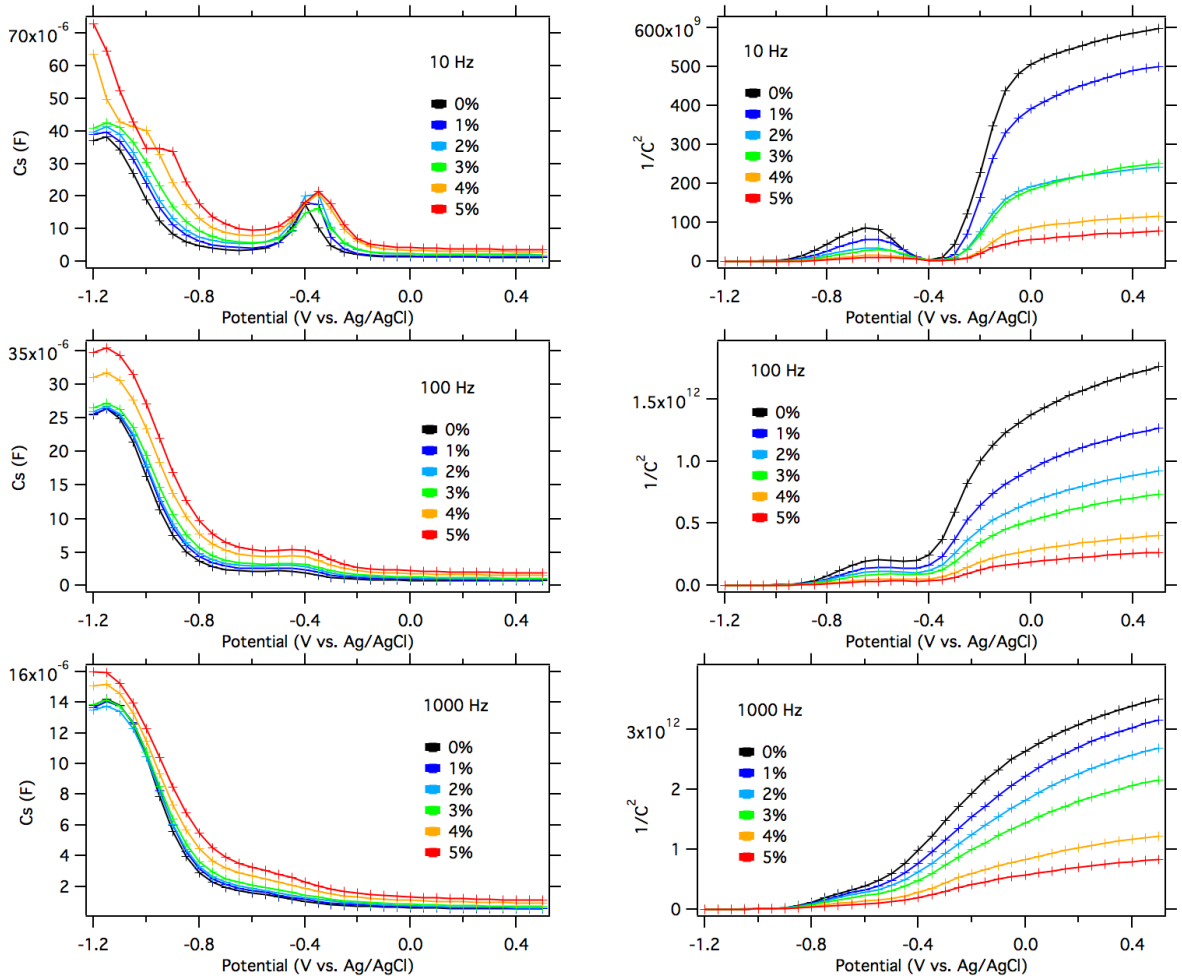


Figure S6. Mott Schottky plots (left) and series capacitance vs. potential (right) of TiO_2 under increasing tensile strain. Data was taken at 10, 100, and 1000 Hz in the dark.

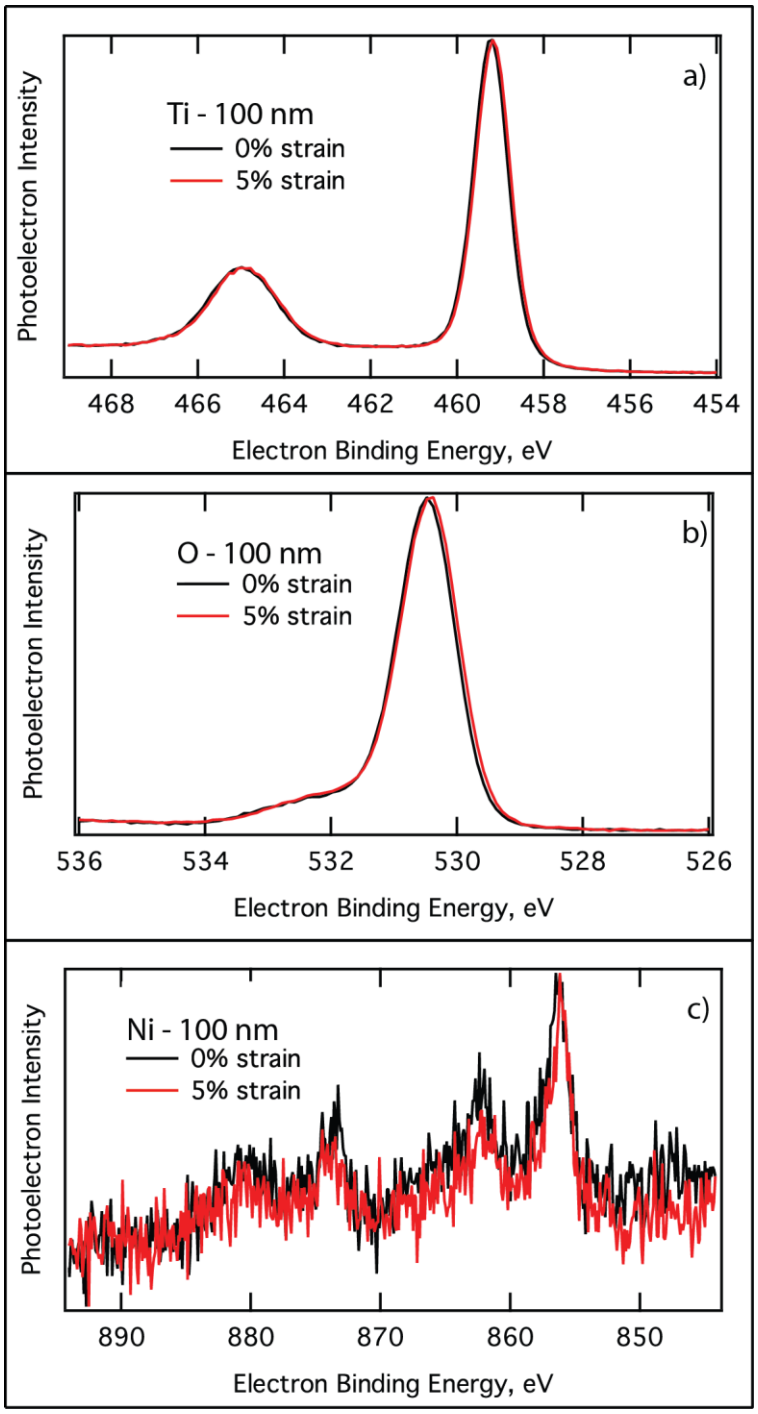


Figure S7. High resolution XPS spectra of (a) Ti 2p, (b) O 1s, and (c) Ni 2p regions under 0 and 5% strain.

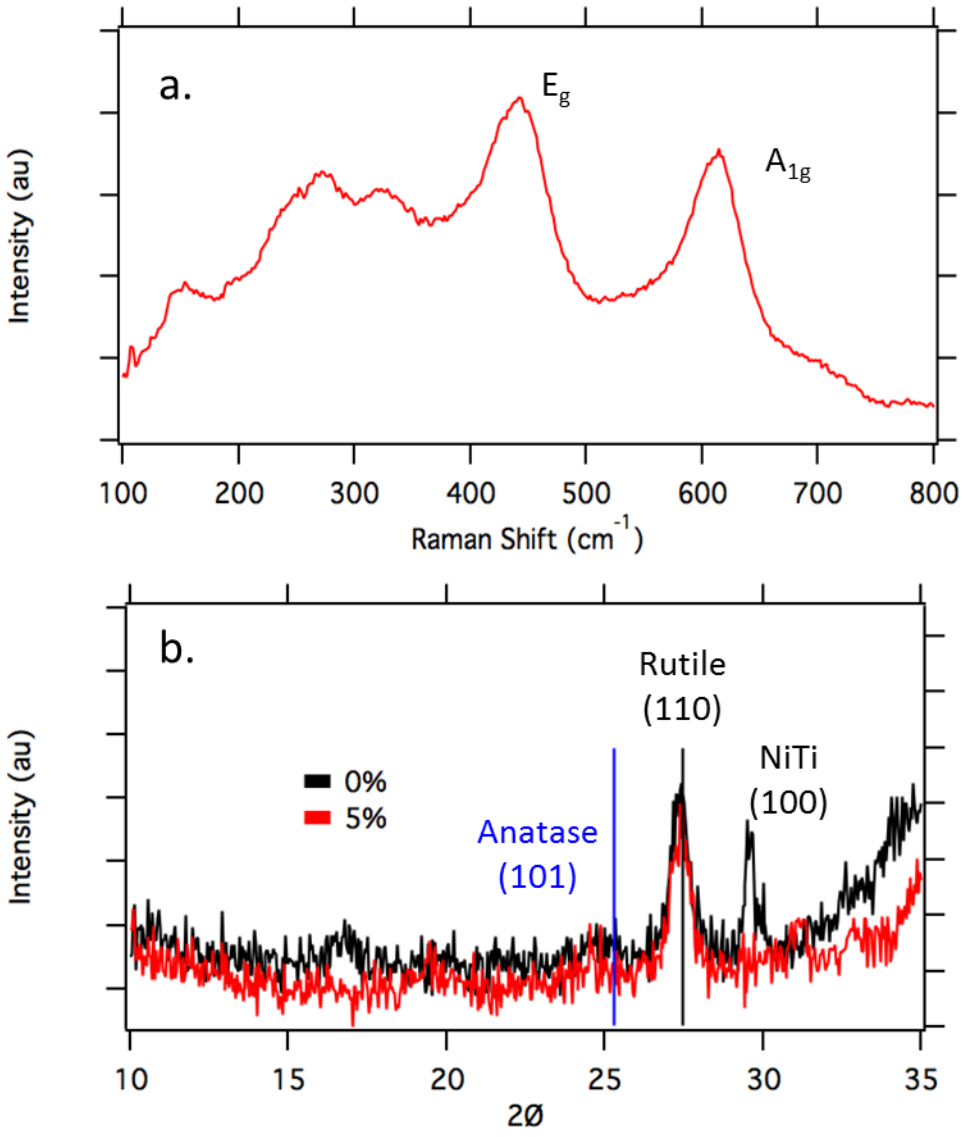


Figure S8. (a) Raman spectra of 50 nm rutile TiO_2 film showing characteristic E_g and A_{1g} modes at 446 and 614 cm^{-1} respectively[1] and (b) grazing angle XRD spectra of rutile TiO_2 film, no Anatase (101) peak at 25.2 is observed, Austenite NiTi (100) peak is present in unstrained sample.

1. Frank, O.; Zukalova, M.; Laskova, B.; Kurti, J.; Koltai, J.; Kavan, L., Raman spectra of titanium dioxide (anatase, rutile) with identified oxygen isotopes (16, 17, 18). *Phys. Chem. Chem. Phys.* **2012,** *14*, 14567-14572.