Electronic Supplementary Informations for: Electrochemical study of TiO_2 inverse opals

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Figure S1: Pictures of colloidal crystals made of PS batch #2 obtained with spin–coating. The upper part of the films is the PS colloidal crystal not infiltrated with TiO_2 showing a green colour due to the second order Bragg diffraction. The lower portion of the film has been infiltrated with TiO_2 with the dip–coating technique showing a blue–violet colour due to the change of the effective refractive index of the film, because of the replacement of air with TiO_2

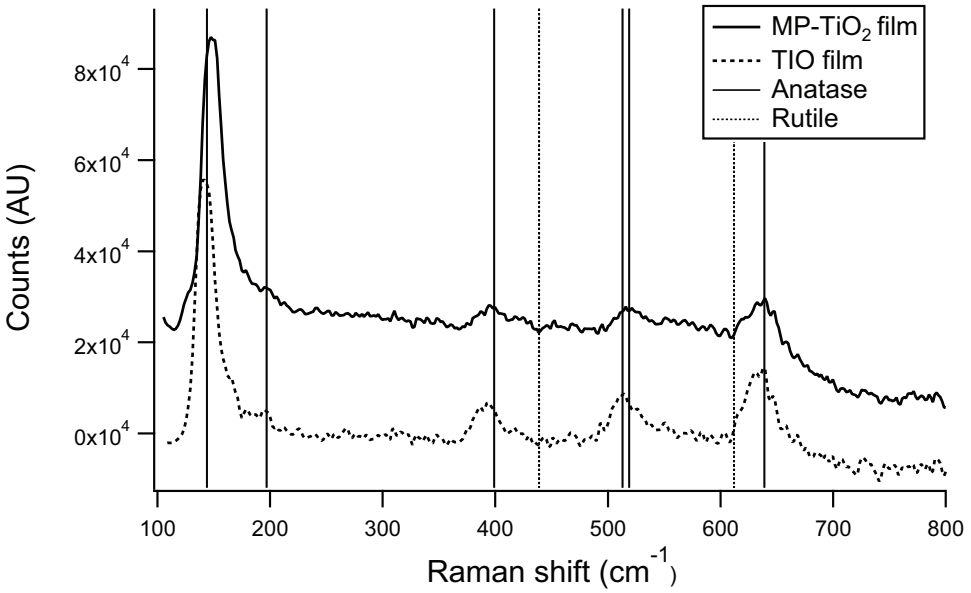

Figure S2: Raman spectra of MP–TiO_2 and TIO batch #1; spectra are shifted for clarity

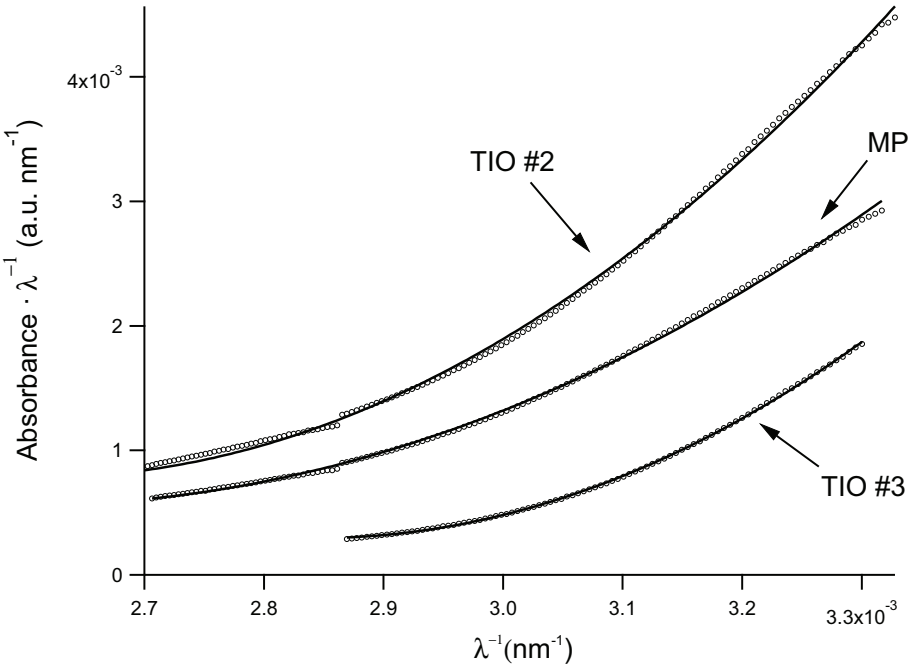

Figure S3: Absorbance divided by the wavelength λ vs the inverse of λ plot used to perform the absorbance spectrum fitting [1]. Circles represent the measured values, the solid lines are the best fits

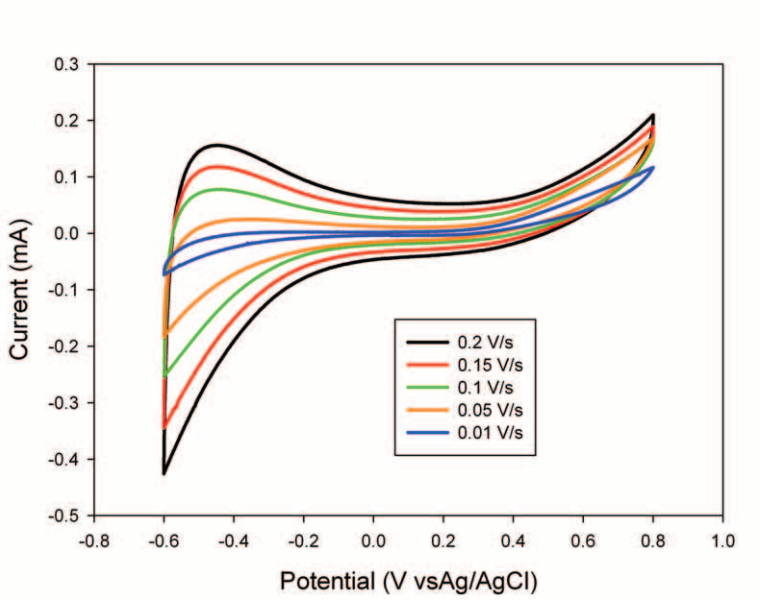

Figure S4: CVs at different scan rates of TIO batch #1 electrode in $NaClO_4$ 0.1 M in acetonitrile under nitrogen purge

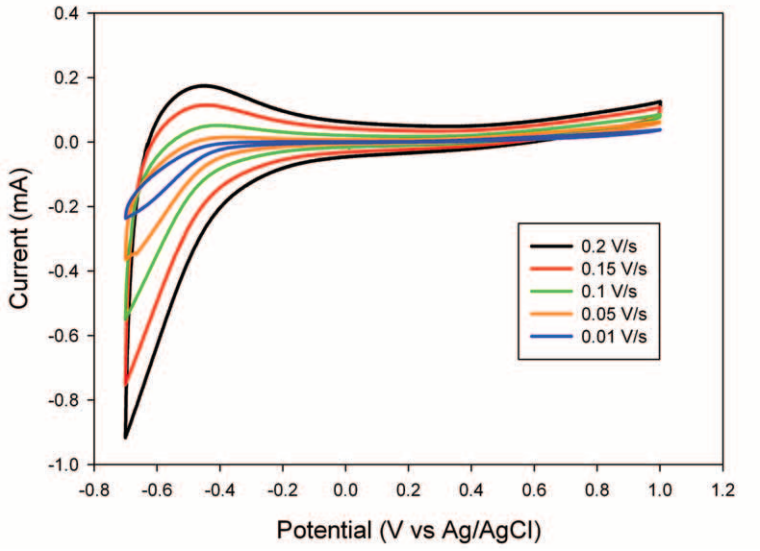

Figure S5: CVs at different scan rates of TIO batch #1 electrode in aqueous $NaClO_4$ 0.1 M at pH 5.5 under nitrogen purge

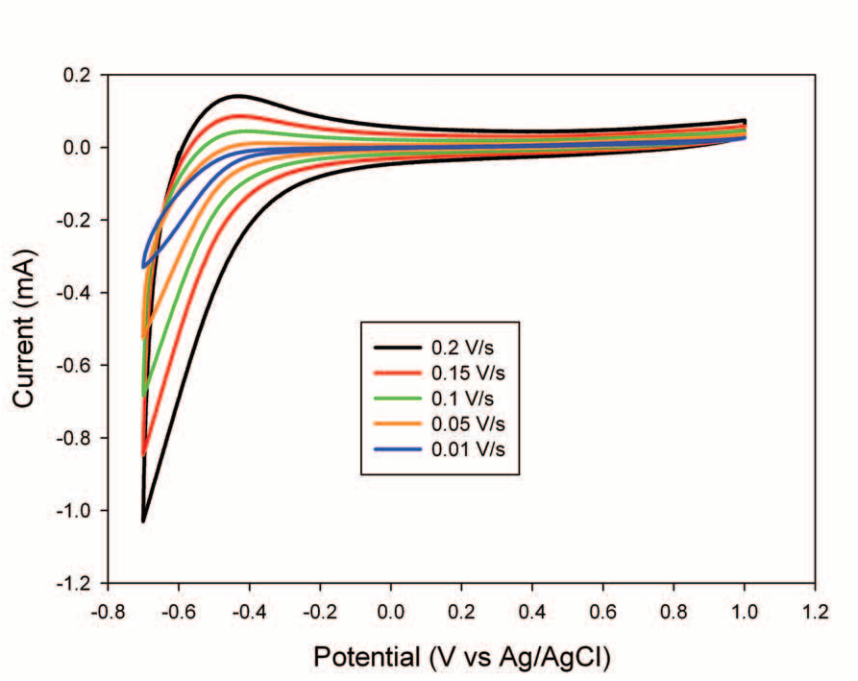

Figure S6: CVs at different scan rates of TIO batch #1 electrode in aqueous NEt_4Br 0.1 M at pH 5.5 under nitrogen purge

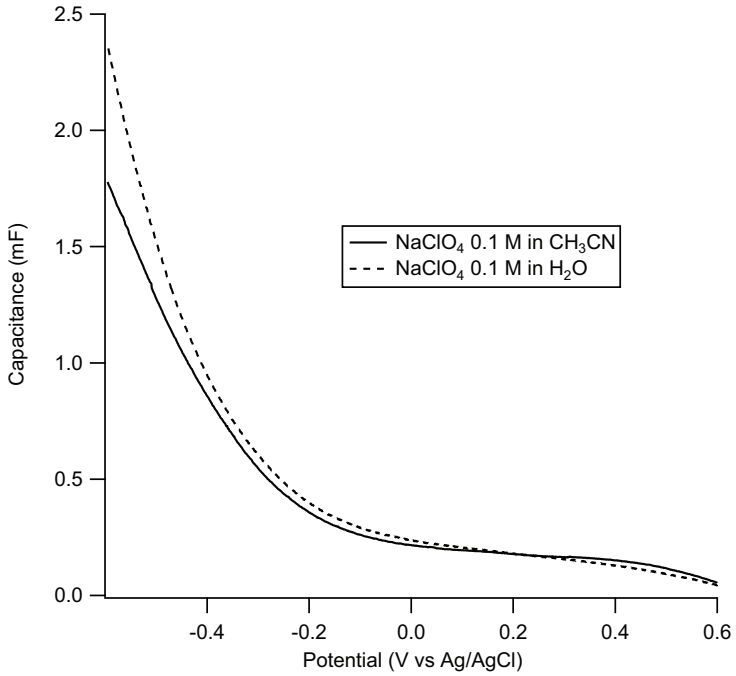

Figure S7: Capacitance of electrode TIO batch #1 as a function of the applied potential in $NaClO_4$ 0.1 in water (pH 5.5) and acetonitrile under nitrogen purge

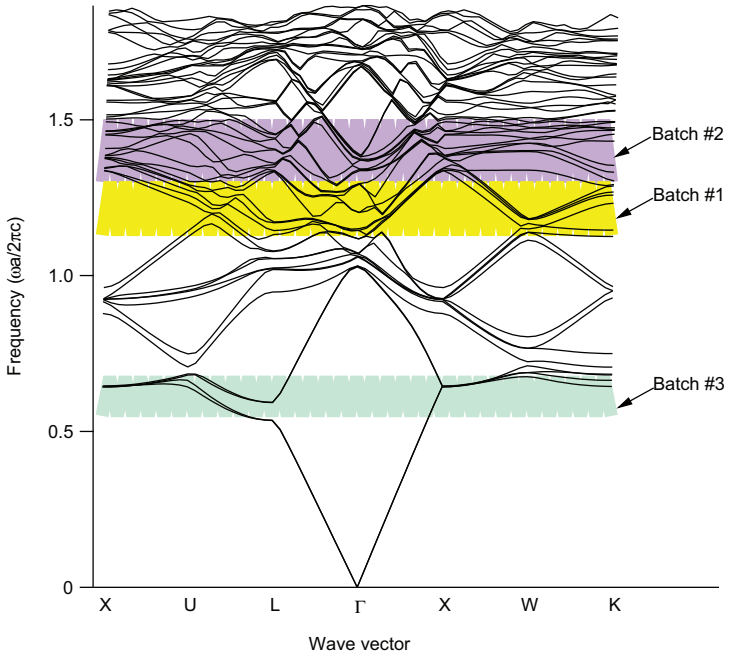

Figure S8: Calculated photonic band diagram for TIO electrodes batches #1, #2 and #3 in water. For each batch the energies at which irradiation has been performed (330–380 nm) are highlighted . For TiO_2 $\varepsilon_1 = 4.4$; for water $\varepsilon_1 = 1.7$

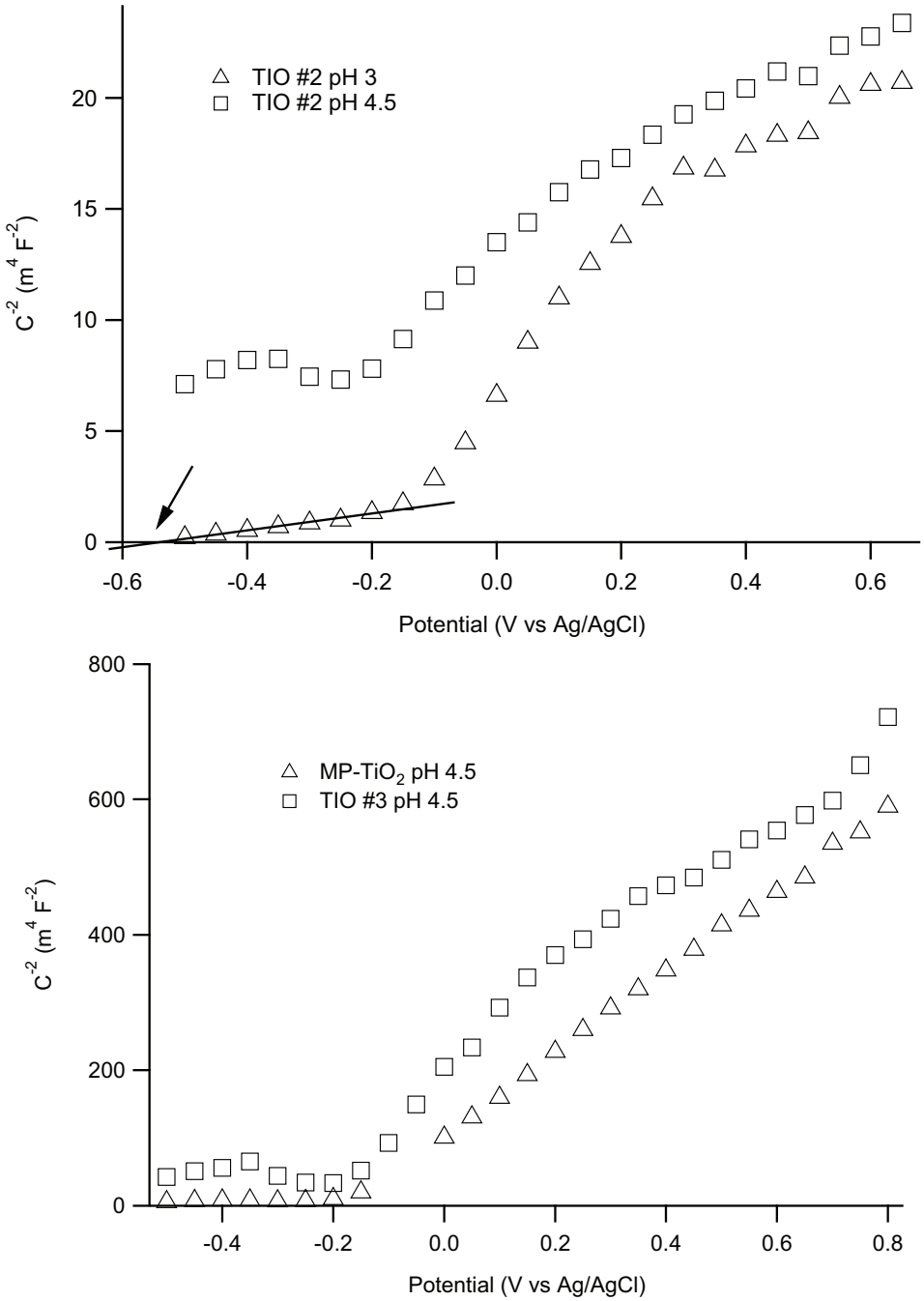

Figure S9: Mott–Schottky plots for TIO batch #2 electrode at pH 3 and pH 4.5 (top) and for MP–TiO_2 and TIO batch #3 electrodes at pH 4.5 (bottom) in aqueous $NaClO_4$ 0.1 M purged with N_2. The arrow indicates a possible extrapolation of the flat band potential accordingly to Erné et al.[2]

References

[1] (*a*) D. Souri and K. Shomalian, *Journal of Non-Crystalline Solids*, 2009, **355**, 1597 – 1601; (*b*) L. Escobar-Alarcón, A. Arrieta, E. Camps, S. Muhl, S. Rodil and E. Vigueras-Santiago, *Applied Surface Science*, 2007, **254**, 412 – 415.

[2] B. H. Ernè, D. Vanmaekelbergh and J. J. Kelly, *Journal of the Electrochemical Society*, 1996, **143**, 305–314.