Supporting Information

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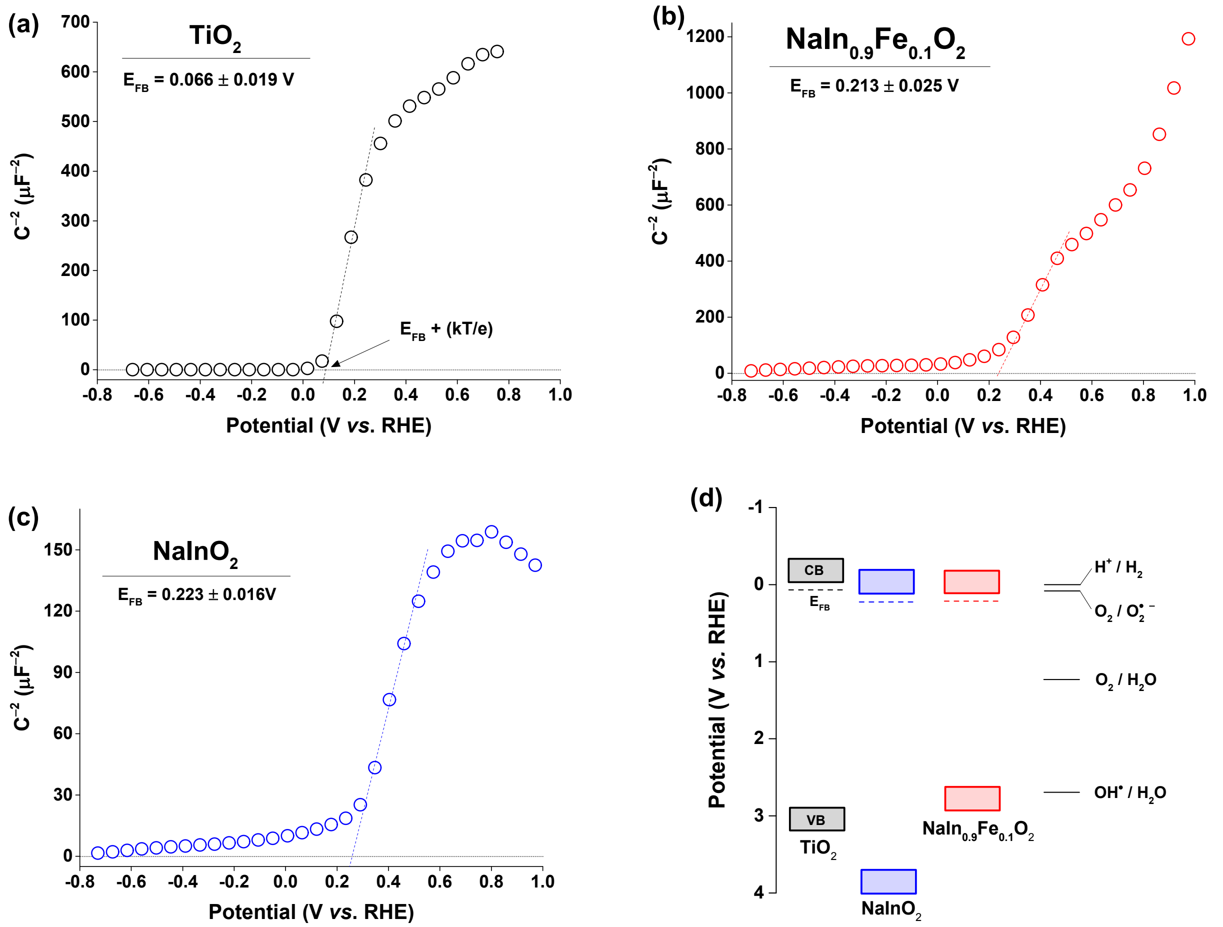
S1. (a-c) Mott-Schottky plots of photocatalysts in N_2 purged 0.5M KCl solution. Curves were collected with a frequency of 1 kHz and a 10 mV amplitude. (d) Energy level diagram showing the flatband, conduction band (CB) and valence band (VB) potentials relative to some relevant electrochemical redox couples.



S2. Electrochemical impedance spectroscopy (EIS) was used to analyze the photocatalysts' flatband potentials (E_{FB}). [1-2] Mott-Schottky plots of C^{-2} *vs.* the electrode potential allows extraction of the photocatalyst E_{FB} according to:

$$\frac{1}{C^2} = \frac{2}{e\varepsilon\varepsilon_0 N}\left(E - E_{FB} - \frac{kT}{e}\right)$$

where C is the capacitance of the space charge region, e is fundamental charge, ε is semiconductor dielectric constant, , ε_0 is permittivity of free space, N is the carrier density, E is the applied electrochemical potential, E_{FB} is the flatband potential, k is the Boltzman constant, and T is the temperature. The linear portion of the Mott-Schottky plot provides a slope equivalent to $2/e\varepsilon\varepsilon_0 N$, and the x-intercept provides $E = E_{fb} + kT/e$.

Conduction band potentials typically range between –1V to –0.4V more negative than E_{FB} for n-type semiconductors,[3] which provides upper and lower bounds for the CB edge. The valence band potential (E_{VB}) can be estimated using the materials' optical band gap ($E_{VB} = E_C + E_g$). Figure S1d provides a relative energy level diagram of the semiconductors in relation to some relevant electrochemical redox couples. This plot shows the band alignment of the photocatalysts is consistent with the potentials required to form the $O_2^{\bullet-}$ and $OH^{\bullet}$ radicals identified in the methylene blue degradation mechanism.

References

1. (a) A. W. Bott, *Current Separations*, 1998, **17**, 87-91; (b) K. Gelderman, L. Lee and S. W. Donne, *J. Chem. Ed.*, 2007, **84**, 685-688.
2. (a) N. Baram and Y. Ein-Eli, *J. Phys. Chem. C*, 2010, **114**, 9781-9790; (b) R. Beranek, *Adv. Phys. Chem.*, 2011, **2011**, Article ID 786759.
3. B. A. Pinaud, Z. Chen, D. N. Abram and T. F. Jaramillo, *J. Phys. Chem. C*, 2011, **115**, 11830–11838.

S3. Absorbance data collected with band pass filters that demonstrate the decomposition of Methylene Blue dye by $NaInO_2$, $NaIn_{0.9}Fe_{0.1}O_2$, and TiO_2.