Supporting Information

Engineered Porous Silicon Counter Electrodes for High Efficiency Dye Sensitized Solar Cells

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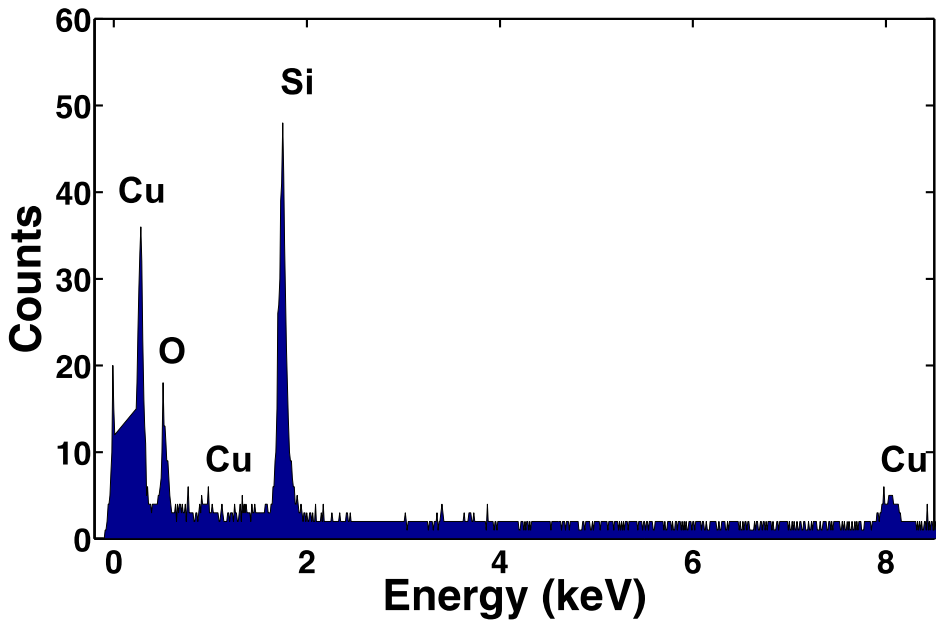

Fig. S1. EDS spectrum corresponding to Figure 1b. This spectrum is an area average of an EDS mapped image. The carbon and silicon signals arise from the material being imaged, the copper signal originates from the TEM grid.

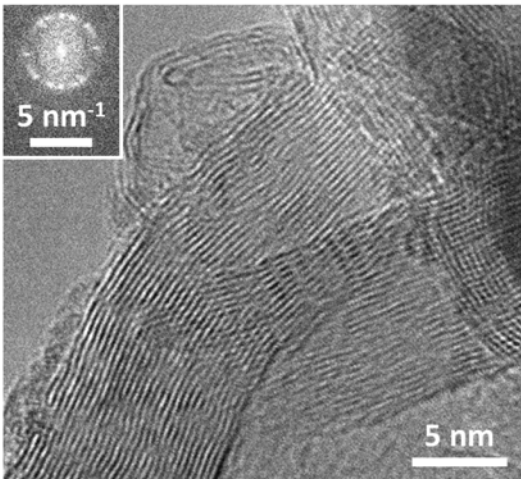

Fig. S2. TEM and FFT of graphene oxide with d-spacing of 0.35-0.36 nm.

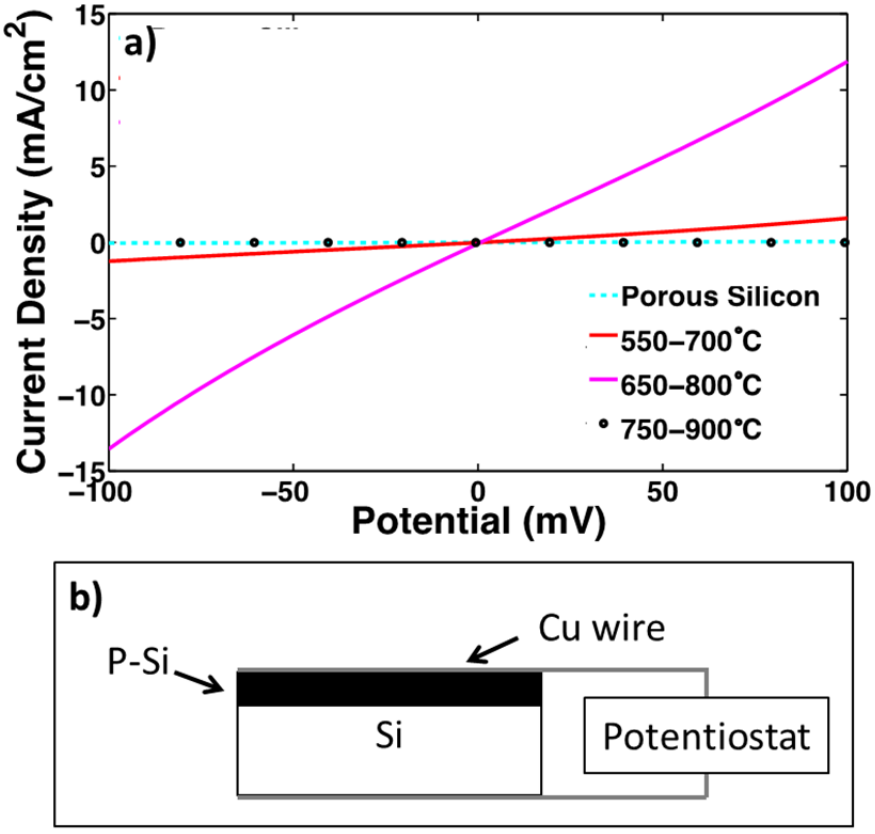

Fig. S3. (a) Through plane conductivity measurements over the potential range of -100mV - 100mV for each porous silicon sample used. Conductances for each material were found by calculating the slope in this linear region. (b) Through plane conductivity schematic. A copper wire connected to a potentiostat was applied to the top and bottom of a porous silicon wafer, a voltage was applied and current was measured.

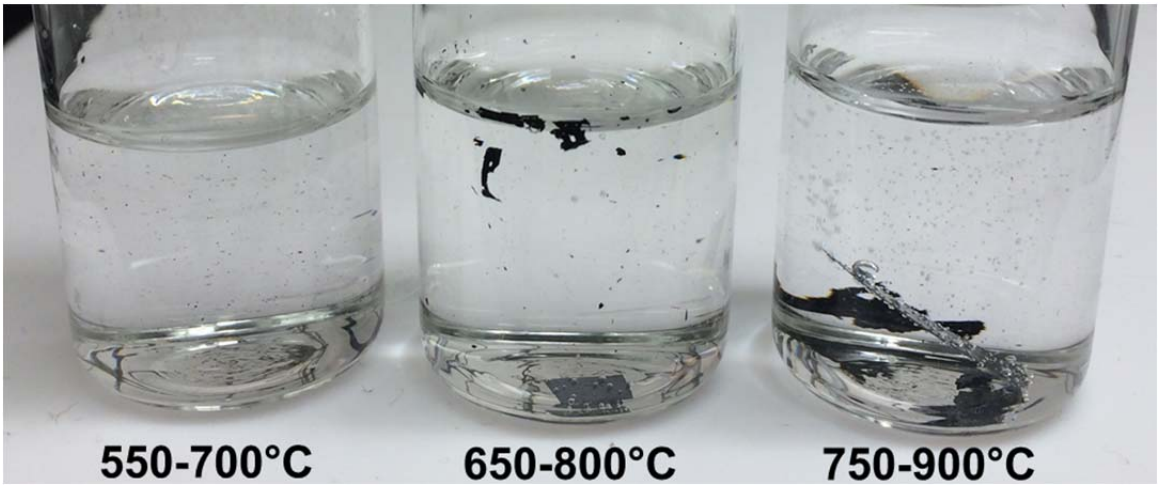

Fig. S4. An image of the carbon coating when silicon has been dissolved away via KOH etching. C-passivated P-Si at 550-700 °C has no visible carbon while those passivated at 650-800 °C has some visible pieces of carbon and C-passivated P-Si at 750-900 °C has one large piece of carbon that did not break apart.

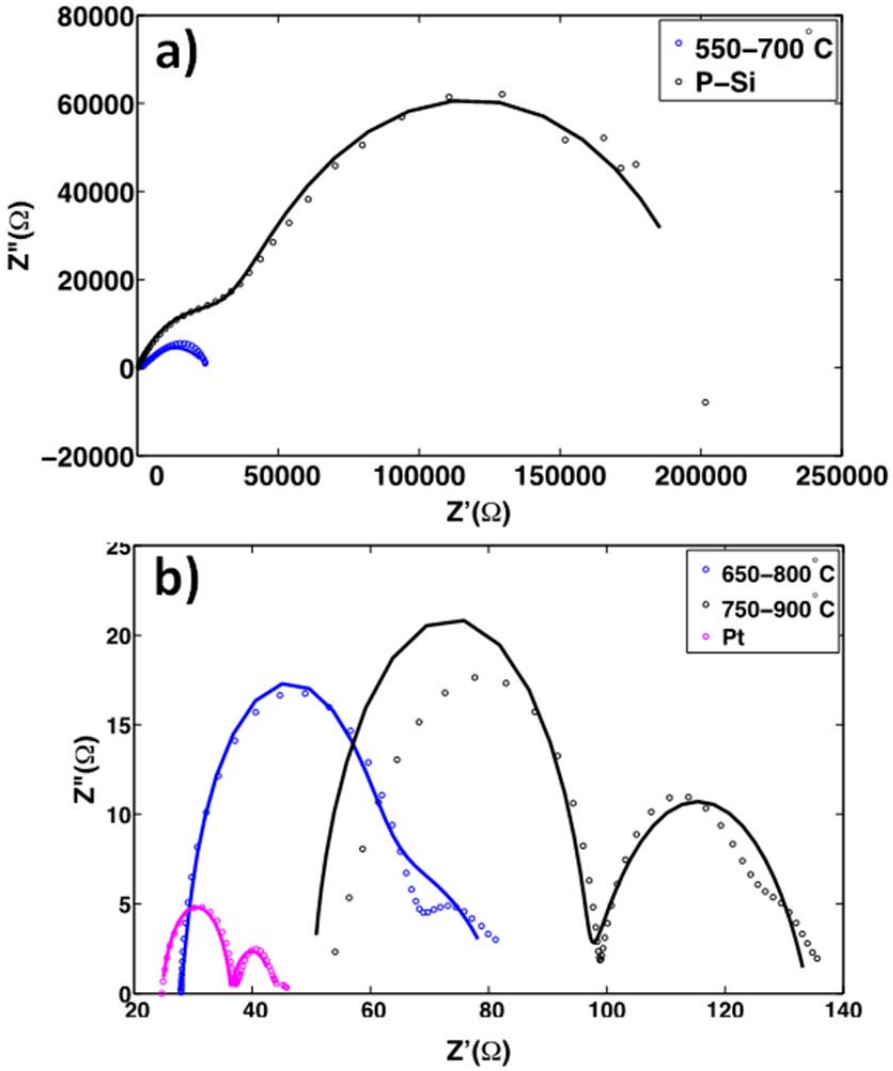

Fig. S5. Nyquist plots and corresponding modeled data for symmetric cells built using (a) C-passivated P-Si at 550-700 °C and pristine P-Si and (b) C-passivated P-Si at 650-800 °C and 750-900 °C and Pt. The difference in scale is due to the vastly different series and charge transfer resistances found in the two sets of samples.

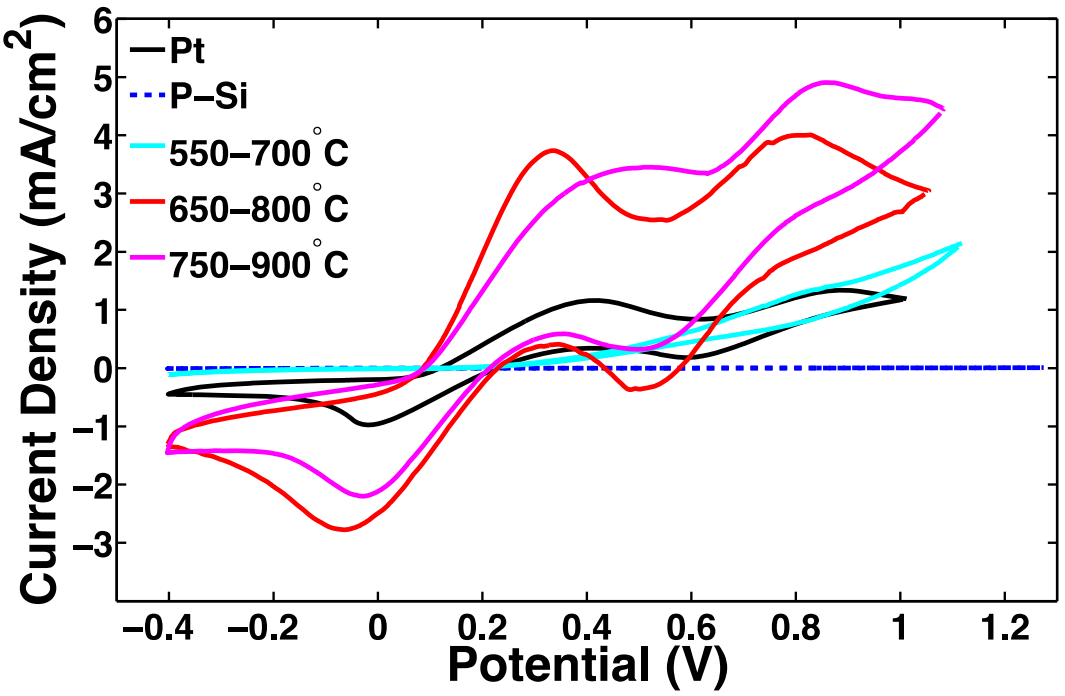

Fig. S6. Cyclic voltammograms of all samples carried out in a three electrode setup using nitrogen bubbled acetonitrile which contained 0.1 M $LiClO_4$, 10 mM LiI and 1 mM I_2 as an electrolyte over a potential range of 1 to -0.8 V. Metallic platinum was used as the counter electrode and Ag/AgCl reference electrode was used.

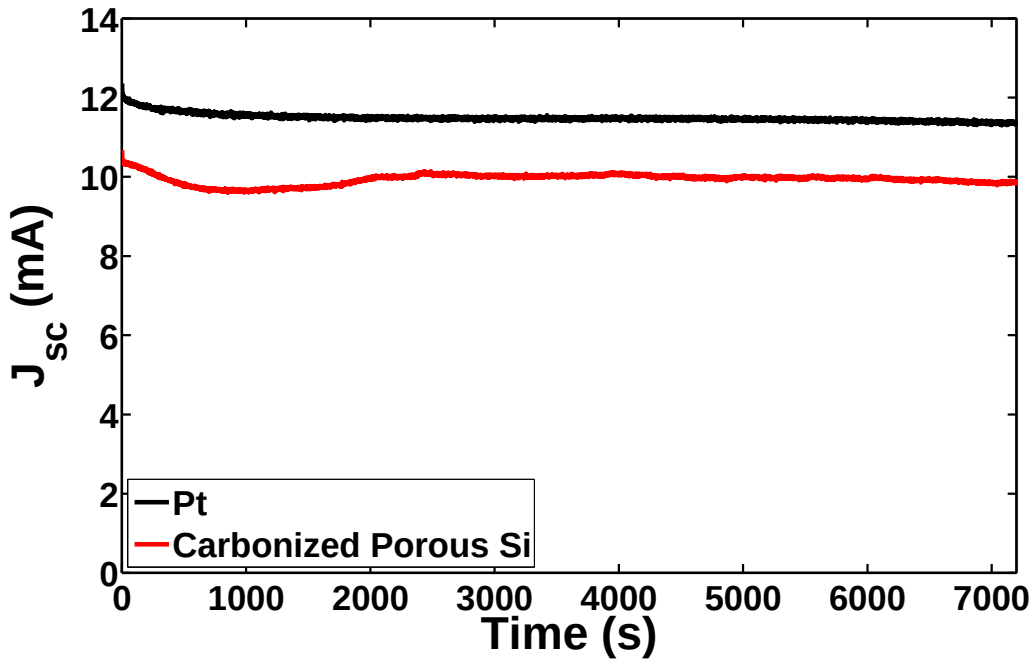

Fig. S7. Stability tests of DSSCs with Pt and C-passivated P-Si counter electrodes over two hours. Results indicate that porous silicon stability is comparable to Pt on the observed timescale.