Supplementary Information

Highly Stable and Scalable Photosynthetic Reaction Center-

Graphene Hybrid Electrode System for Biomimetic Solar Energy

Transduction

Haojie Zhang,^{+a} Anne-Marie Carey,^{+b} Ki-Wan Jeon,^a Minghui Liu,^c Travis D. Murrell,^b Joshua Locsin,^b Su Lin,^b Hao Yan,^c Neal Woodbury^{*b} and Dong-Kyun Seo^{*a}

 ^aSchool of Molecular Sciences, Arizona State University, Tempe, AZ 85287, USA
^bCenter for Innovation in Medicine, Biodesign Institute, Arizona State University, Tempe, AZ 85287 USA
^cCenter for Molecular Design and Biomimetics, Biodesign Institute, Arizona State University, Tempe, AZ 85287 USA



Figure S1. XPS spectra of mRGO (a) wide scan and (b) high-resolution S2p.



Figure S2. Photocurrent of mRGO-RC slide 0.1 M Tris buffer with 100 μ M reduced cytochrome c and 250 μ M Ubiquinone-0



Figure S3. Photocurrent of RC/mRGO system when open circuit potential is applied.



Figure S4. Photocurrent of RC/mRGO system before and after injecting cytochrome c.



Figure S5. AFM (a) and SEM (b) image of RC/mRGO on Si Wafer. In (a) RC molecules are observed as small particles in the size range from 7 to 15 nm, while the mRGO underneath lies flat but with significantly protruding winkles (streaks). The winkles can be seen more clearly in the SEM image (b).



Figure S6. Photocurrents of RC/mRGO system after different storage periods under light at room temperature in an aerobic condition.



Figure S7. Photocurrent of mRGO-RC slide 0.1 M Tris buffer with a) 250 μ M UQ and different amount cytochrome c and b) 100 μ M cytochrome c and different concentrations of UQ. In our preliminary photocurrent measurements, photocurrent could be enhanced by adding more cytochrome c in the buffer. However, considering the cost of cytochrome c and the similar photocurrent by adding 100 and 250 μ M cytochrome c, we chose 100 μ M cytochrome c for our photocurrent measurement. The UQ concentration was optimized under the same way.