Supplementary Materials

Visible Light Enhanced Extracellular Electron Transfer between a Hematite Photoanode and *Pseudomonas aeruginosa*

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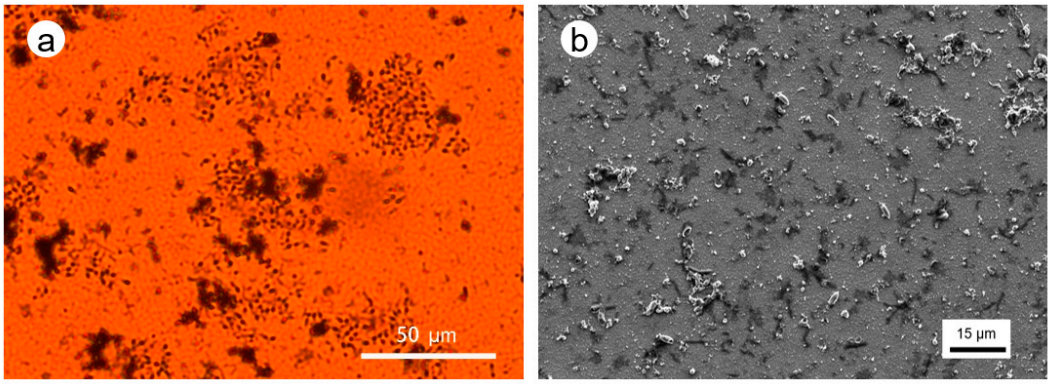

Figure S1. (**a**) Light microscopy picture of bio-photoanode; (**b**) ESEM picture of bio-photoanode.

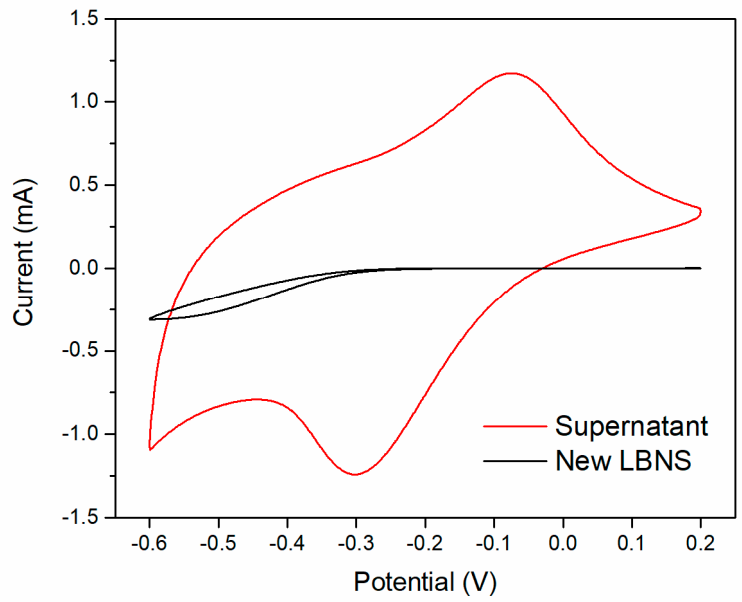

Figure S2. Cyclic voltammetry results of the supernatant from live cell culture and fresh LBNS.

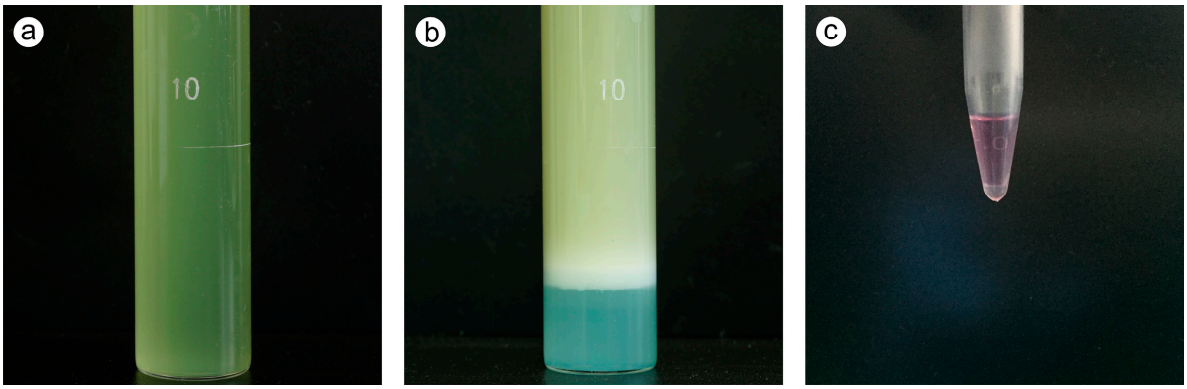

Figure S3. (**a**) Pyocyanin in live cell culture; (**b**) Liquid-liquid extraction for pyocyanin by $CHCl_3$; (**c**) Liquid-liquid extraction for pyocyanin by HCl.

Silver colloids were prepared as follows by a modified procedure of Leopold and Lendl [1] and subsequently, transferring 40 μL of pyocyanin-HCl solution and 200 μL of silver colloids into centrifuge tubes. The mixture was dropped onto a glass slide for the surface-enhanced Raman scattering (SERS) measurement. The SERS of pyocyanin were measured by Raman spectroscopy with a Renishaw inVia Reflex system (Renishaw, UK) equipped with a 785 nm laser and a 50× objective. The laser intensity was 1% with an exposure time of 10 s and the Raman spectrum was the average of 20 successive scans. As shown in Figure S4, at 412, 521, 547, 634, 676, 810, 1180, 1356, and 1610 cm^{-1} clearly distinguishable Raman bands are ascribed to the pyocyanin [2–4]. According to the vibrational assignments, the Raman spectrum of pyocyanin was dominated by aromatic ring stretchings at 1356, 1610 cm^{-1}, followed by a group of signals between 407 and 690 cm^{-1} associated with different ring deformations. The signal at 1356 cm^{-1} corresponds to the combined C–C stretching, C–N stretching and C–H in-plane bending modes of the aromatic ring [2–4].

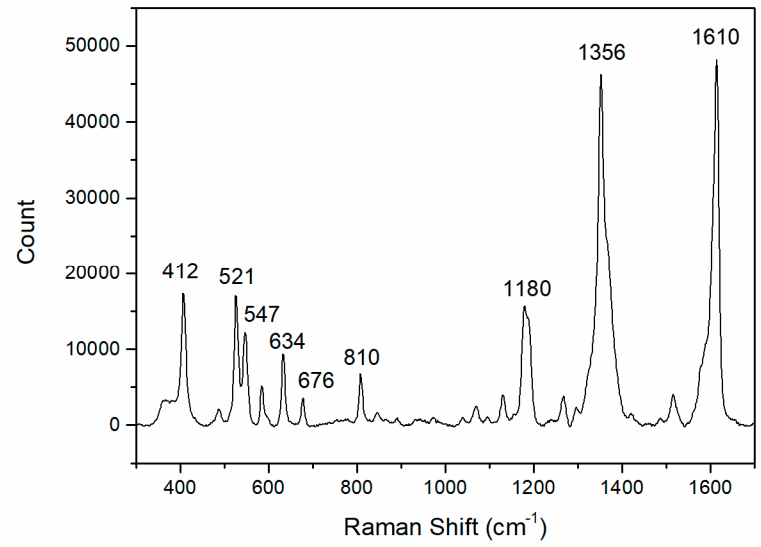

Figure S4. SERS spectra of pyocyanin isolated from centrifuged supernatant of live cell culture.

References

1. Leopold, N.; Lendl, B. A new method for fast preparation of highly surface-enhanced Raman scattering (SERS) active silver colloids at room temperature by reduction of silver nitrate with hydroxylamine hydrochloride. *J. Phys. Chem. B* **2003**, *107*, 5723–5727.
2. Bodelón, G.; Montes-García, V.; López-Puente, V.; Hill, E.H.; Hamon, C.; Sanz-Ortiz, M.N.; Rodal-Cedeira, S.; Costas, C.; Celiksoy, S.; Pérez-Juste, I.; et al. Detection and Imaging of Quorum Sensing in *Pseudomonas Aeruginosa* Biofilm Communities by Surface-Enhanced Resonance Raman Scattering. *Nat. Mater*. **2016**, *15*, 1203–1211.
3. Wu, X.M.; Chen, J.; Li, X.B.; Zhao, Y.P.; Zughaier, S.M. Culture-free diagnostics of *Pseudomonas aeruginosa* infection by silver nanorod array based SERS from clinical sputum samples. *Nanomed. Nanotechnol. Biol. Med.* **2014**, *10*, 1863–1870.
4. Žukovskaja, O.; Jahn, I.J.; Weber, K.; Cialla-May, D.; Popp, J. Detection of *Pseudomonas aeruginosa* Metabolite Pyocyanin in Water and Saliva by Employing the SERS Technique. *Sensors* **2017**, *17*, 1704.