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Extracellular polymeric substances play roles in extracellular electron transfer of *Shewanella oneidensis* MR-1

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It is well known that microorganism is surrounded by extracellular polymeric substances (EPS) which include polysaccharides, proteins, glycoproteins, nucleic acids, phospholipids, and humic acids. However, previous studies on microbial extracellular electron transfer (EET) are conducted on cells without extracting EPS or cells collected from log stage or early-steady stage cultures with little EPS. Therefore, microbial cells are believed in contact directly with each other or electrode. Such attempt apparently ignored the role of EPS in microbial EET, even though many components of EPS, such as DNA, humic acids and some proteins, are electrochemically active or semiconductive. Herein, we report experimental evidences of EPS role on EET for *Shewanella oneidensis* MR-1.

Atomic force microscopy clearly showed that the cell surface was cleaned and few EPS could be observed on MR-1 after the extraction (Figure 1.a and 1.b). Comparing to cells in control group, MR-1 treated at 38 °C for EPS extraction showed different electrochemical characterizations as revealed by differential pulse voltammetry (Figure 1.c). EPS extracted from MR-1 also was proved to be electrochemically active. The present study indicated that EPS play important roles in EET of MR-1.

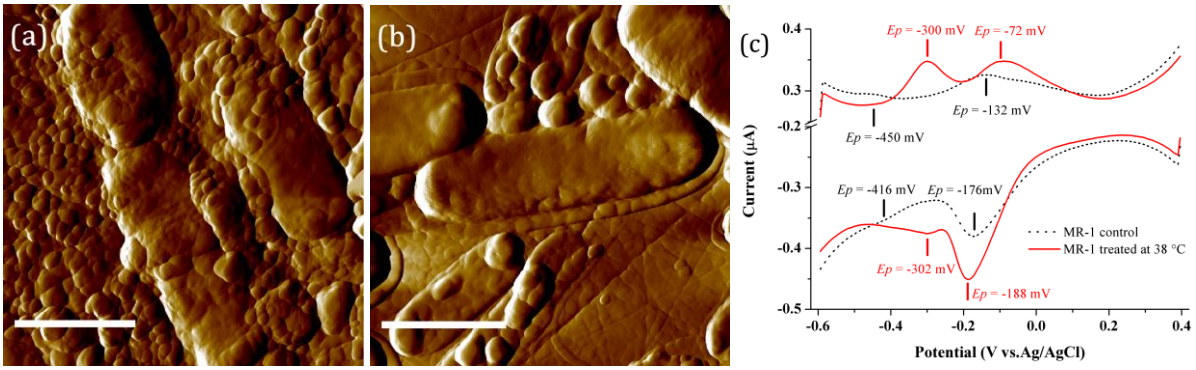

Figure 1 Atomic force microscopy shows more EPS surrounding the MR-1 cells in control groups treated 30 °C (a), comparing to those treated at 38 °C (b). Scale bar: 2 μm. Voltametric analysis of MR-1 treated at 30 °C (dotted line) and 38 °C (solid line) (c).

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