Supporting Information for

**Bacterial Formation of Extracellular U(VI) Nanowires**

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Methods

Bacterial growth conditions

Culture medium contained 30 mM NaHCO_3_, 10 mM sodium lactate as the electron donor, and ~2 mM uranly acetate (UO_2(CH_3COO)_2·2H_2O)) as the electron accepter for the synthesis of uranium nanowires. The pH was adjusted to 7.0. *S. oneidensis* MR-1 was inoculated into sealed serum bottles with 30 ml N_2_ purged culture medium at a final cell density of 2 x 10^8 cells/ml. All the cultures were incubated anaerobically in the dark at 30°C for 120 hrs.

Measurements of U(VI) and lactate in culture medium

The samples were collected at selected time during incubation for the detection of soluble uranium and lactate consumption in aqueous medium. For measuring the concentration of uranium, the culture supernatants were filtered through a 0.2 μm membrane filter (MFS-25, Advantec MFS, Inc., Dublin, CA), and the filtrates were diluted and acidified with 2% HNO_3_ for analysis using inductively-coupled plasma mass spectrometry (ICP-MS, Agilent Technologies 7500ce, Palo Alto, CA). The concentration of lactate was detected by HPLC (Shimazu, Tokyo, Japan), which was equipped with a SPD-10A UV detector (Shimazu, Tokyo, Japan) and a Shodex RSpak KC-811 (8.0mmID*300mm) column (Shodex, Tokyo, Japan). The mobile phase was 5mM sulfuric acid with a flow rate of 0.5 mL/min, and the UV detection was performed at 210 nm.

Characterization of materials

The morphology of the uranium nanostructures was examined by using
transmission electron microscopy (TEM). The TEM images and selected area electron
diffraction (SAED) were obtained using a Jeol JEM-2100F (Tokyo, Japan).

Cryo-electron microscopy was carried out with culture medium of *S. oneidensis* MR-1
obtained at 12 hr incubation. About 4 μl of the sample was suspended onto
non-treated 400 mesh copper lacey carbon grids. These grids were then blotted and
plunge-frozen using an FEI Vitrobot, Mark I (FEI, Hillsboro, Oregon) with the setting
of 100% humidity, 4°C, and blot time of 2.5 seconds. The vitreous ice sample grids
were maintained at around -178°C within electron microscope using a side-entry
Gatan 626 cryo holder (Gatan, Pleasanton, CA). Detailed technical procedures of
cryo-EM were described in ref1. The mineralogical property of the nanostructures was
investigated by using X-ray diffraction (XRD, D/MAX Ultima III, Rigaku, Tokyo,
Japan) spectra, XANES (X-ray absorption near edge structure) and EXAFS
(extended X-ray absorption fine structure) spectra (Pohang Accelerator Laboratory,
Pohang, Korea).

Reference

Figure S1. TEM images of heat-killed *S. oneidensis* MR-1 incubated in the medium with 2 mM uranyl acetate.
ESI Figure S1.