Microbial Nanowire Electronic Structure Probed by Scanning Tunneling Microscopy

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— Complex molecules produced by living organisms provide laboratories for interesting physical properties. The study of such interesting physics, likewise, gives new insight into intriguing biological processes. We have studied the pilus nanowires expressed by the bacterium, Geobacter sulfurreducens, using high resolution scanning tunneling microscopy (STM). G. sulfurreducens is a metal reducing bacterium that has evolved electrically conductive pili to efficiently transfer electrons across large distances. Here we employ the electronic sensitivity of STM to resolve the molecular substructure and the local electronic density of states (LDOS) along the nanowire, in an effort to elucidate the mechanism of conduction. We observe LDOS dependent upon the location of the tip above the nanowire.

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