Supporting Information

1. Typical cyclic voltammograms of electro-active specie (potassium ferricyanide) on OH-ITO, SH- ITO and CH₃-ITO respectively, which shows the same electrochemical activity on all three electrodes and no reaction resistance for two silanes.



Fig. S1 Typical cyclic voltammograms of electro-active molecular (potassium ferricyanide) on superhydrophilic ITO electrode (OH-ITO), hydrophilic ITO electrode modified by (3-mercaptopropyl) trimethoxysilane (SH- ITO) and trichloro (propyl)silane (CH₃-ITO), respectively. Here 0.2 M potassium ferricyanide in 1 M KCl solution was used as electrolyte, modified ITO electrodes were used as working electrode, Ag|AgCl (sat. KCl) and a platinum wire were used as the reference and counter electrode, respectively.

2. Statistic current values after 24 h bacteria cultivation on three kinds of electrodes with five trials averaged, suggesting positive correlation between EET activity and electrode hydrophilicity.



Fig. S2 Statistical currents genrated on OH-ITO, SH-ITO and CH₃-ITO electrodes respectively after a cultivation of 24 h, five trials were averaged for each.

3. Current versus time curve in the presence of exogenously added riboflavins at a constant potential of +0.2 V on electrodes of different wettability without microbes. The generated currents were nearly 0 μ A in each case: on OH-ITO, SH-ITO, and CH₃-ITO electrodes. Here only I-t curves for OH-ITO were shown.



Fig. S3 Current versus time curve in the presence of exogenously added riboflavins at a constant potential of +0.2 V vs. Ag/AgCl (sat. KCl) on OH-ITO electrode without microbes. The riboflavins were initially added in the EC.

4. The detail calculating process for current density (*I*) on electrode of different wettability.

The calculating is similar with reported in literature.^[1] Two reactions were contained in microbe-electron interface: Reduction of oxidized flavin to semiquinone by OMCs,

Heme (Re) + Flavin (Ox)
$$\rightarrow$$
 Heme (Ox) + Flavin (Sq)

Electron transfer from semiquinone to electrode.

Flavin (Sq) \rightarrow Flavin (Ox) + e⁻ (Electrode)

In equation 2, the reaction is highly exergonic when the applied potential is +0.2 V (vs. Ag/AgCl) for electrode. As a consequence, reaction in equation 1 is the rate-determining step.

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According to arrhenius equation and considering consecutive electrons were injected into heme, so we could only consider the forward $(k_{\bar{1}})$ reaction:

$$k_{\vec{i}} = k_0 \exp[-\frac{\alpha nF}{RT} \Delta E]$$

The meaning of different symbols is:

 k_0 : standard rate constantn: number of electrons α : electron transfer coefficientR: ideal gas constantT: temperatureF: faradic constant

 ΔE : potential discrepancy between flavin and heme

As reported, heme center for flavin binding site is -120 mV (vs. Ag/AgCl).^[2] Here, we assume one-electron transfer process happened on three electrodes, then n=1. For OH-ITO, SH-ITO and CH₃-ITO, E_p of flavin is -320 mV, -344 mV and -390 mV respectively. If k_{CH_3-ITO} is made 1, based on above, k_{OH-ITO} and k_{SH-ITO} is obtained.

Further, according to the Butler-Volmer equation $I = nFk_7C_R$, If I_{CH_3-ITO} is made 1, I_{OH-ITO} and I_{SH-ITO} are obtained.

α	0.4	0.5	0.6
I _{OH-ITO}	10.98	14.04	18.05
I _{SH-ITO}	3.61	4.30	5.14
I _{CH3-ITO}	1.00	1.00	1.00

Table S2. Calculated result for the current density (I) on OH-ITO, SH-ITO and CH₃-ITO respectively. Here I_{CH_3-ITO} was made 1.

5. Statistic cell density on three electrodes after 28 h of electrochemical cultivation, showing much higher amounts of microbes on superhydrophilic OH-ITO than that on SH-ITO and CH_3 -ITO electrodes.



Fig. S4 Statistical cell density on three electrodes after 28 h of electrochemical cultivation, three trials were averaged for each.

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