

Supporting Information

Theoretical and Experimental Verification of Imaging Resolution Factors in Scanning Electrochemical Microscopy

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S1. Theory

IR

$$dR_G^{0.358} [0.009568 \pi \frac{d}{a} R_G^{1.642} + 3.14 \pi \frac{d}{a} R_G + 2 \pi R_G \ln R_G + 4.16 \pi \left(\frac{d}{a} \right)^2 R_G^{0.64}]$$

$$= \frac{[0.004784 \pi \frac{d}{a} R_G^2 + \pi R_G^{1.358} \ln R_G + 2 \frac{d}{a} R_G^{0.358} \ln \left(1 + \frac{\pi R_G}{2 \frac{d}{a}} \right)] * [0.68 \frac{d}{a} + 0.3315 \frac{d}{a} \exp \left(\frac{-1.0672}{\frac{d}{a}} \right) + \pi \frac{d}{a} R_G^{1.358} [-0.5174 \frac{d}{a} + 0.520455 \frac{d}{a} \exp \left(\frac{-1.0672}{\frac{d}{a}} \right) + 1.2305189] + \pi \left(\frac{d}{a} \right)^2 R_G [-0.6656 \frac{d}{a} +$$

Formula S1. The imaging resolution formula.

```
function Y=objFunc(x)
    A=(0.68+0.78377*x(1)/x(2)+0.3315*exp(-1.0672*x(1)/x(2))-(2.08/(x(3)^0.358)*(x(2)/x(1)-0.145/x(3))+1.585)/(2.08/(x(3)^0.358)*(x(2)/x(1)+0.0023*x(3))+1.57+log(x(3))*x(1)/x(2)+2/(pi*x(3))*log(1+pi*x(3)*x(1)/2/x(2)))));
    Y=(2*x(1))/A;
end
[x fval ef]=fmincon(@objFunc,[5 5 5],[],[],[],[],[0.1 0.1 1],[10 10 10])
```

Formula S2. MatLab calculation code.

S2. Experimental Section

S2.1. Fabrication of Au microelectrodes

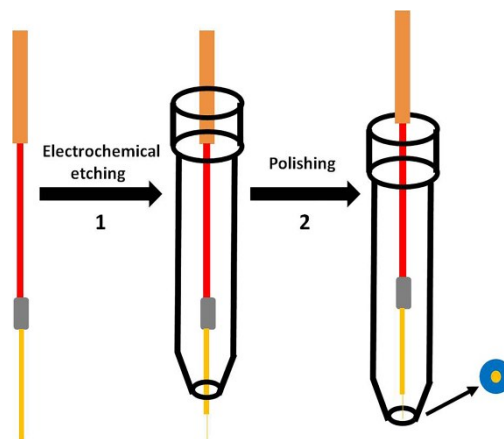


Figure S1. Schematic illustration of the fabrication of Au microelectrodes.

S3. Results and discussion

S3.1. Cyclic voltammetry responses of Au microelectrodes

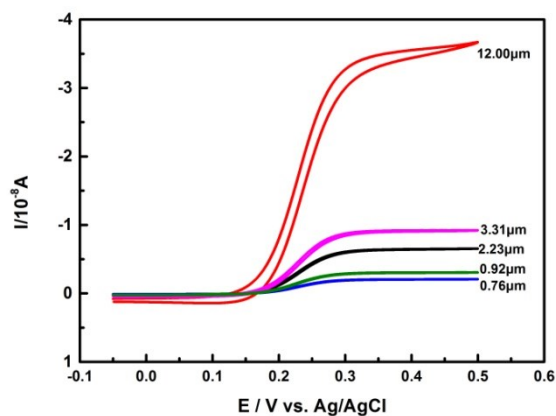


Figure S2. Cyclic voltammetry responses of Au disk electrodes at different effective radius in 10 mM $\text{K}_3\text{Fe}(\text{CN})_6$ solution containing 0.5 M KCl with a scanning rate of 5 mV/s.

S3.2. Calculation of the effective radius of Au microelectrodes

Table S1. Steady-state limiting current and the corresponding effective radius

	1	2	3	4	5
I_{lim}	33.3 nA	9.20 nA	6.20 nA	2.56 nA	2.11 nA
R_{eff}	12.00 μm	3.31 μm	2.23 μm	0.92 μm	0.76 μm

S3.3. SEM images of the tip electrodes

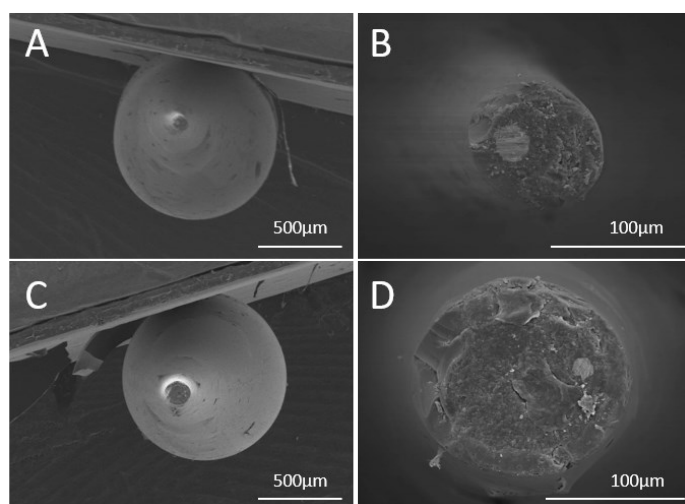


Figure S3. SEM images of the tip electrodes with 24.00 μm (A and B) and 12.00 μm (C and D) in diameter.