# Supporting Information

## A novel stainless steel needle electrode based on porous gold nanomaterials for determination of copper in seawater

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**The calculation process of the LOD**

The LOD in this manuscript was calculated from 3Sb/k, where Sb was the standard deviation of blank samples for 10 measurements, k was the slope of calibration curve at low concentration range.

The standard deviation of blank samples (Sb) was calculated as $0.25\times10^{-3}$, and the calibration curve at low concentration range (4 points, 0.7, 3, 5, 10 nM) was Ip = 3.13C + 0.03 (k was 3.13). So the LOD was calculated as $3\times0.25\times10^{-3}/3.13 = 0.24\times10^{-3}$ μM (0.24 nM).

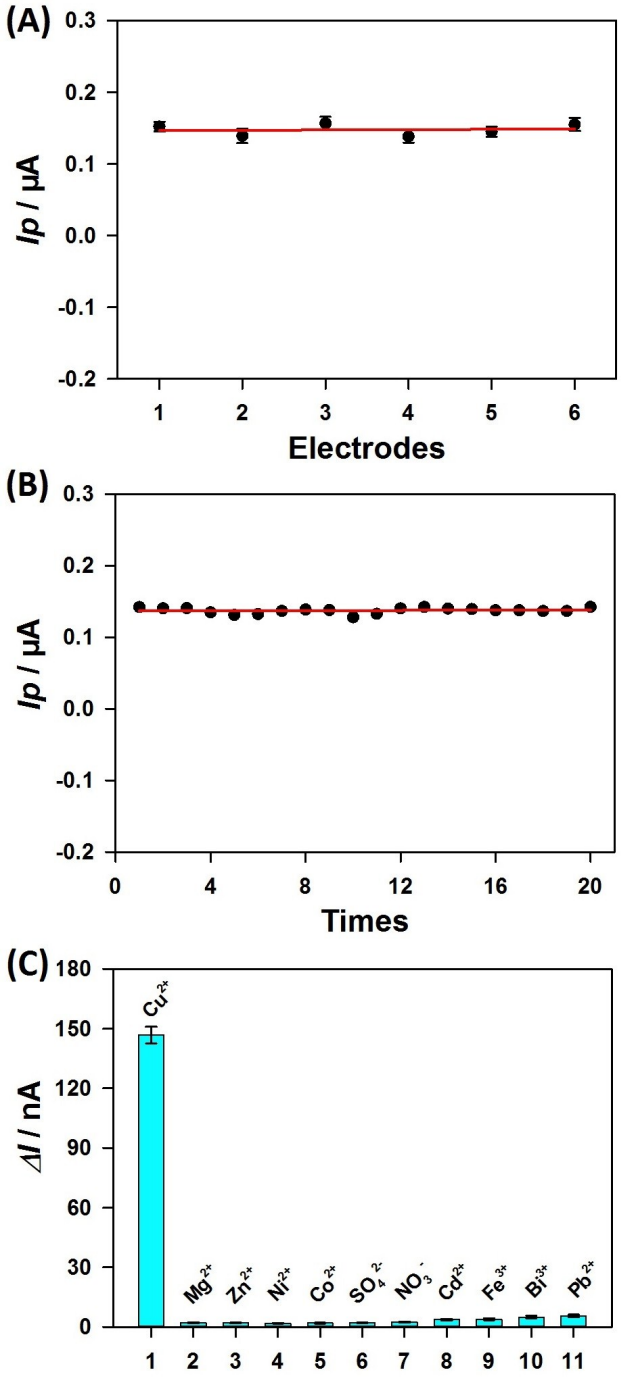


**Fig. S1.** The peak current (Ip) obtained for 50 nM $Cu^{2+}$ in acetate buffer (pH 4.5) solution with six P-Au/PDA/ANEs prepared independently (A) and with the same P-Au/PDA/ANE for 20 measurements. (C) Current change (ΔI) recorded with P-Au/PDA/ANE in acetate buffer (pH 4.5) solution in the presence of 50 nM $Cu^{2+}$, 5 μM $Mg^{2+}$, 5 μM $Zn^{2+}$, 5 μM $Ni^{2+}$, 5 μM $Co^{2+}$, 5 μM $SO_4^{2-}$, 5 μM $NO_3^-$, 2.5 μM $Cd^{2+}$, 2.5 μM $Fe^{3+}$, 0.5 μM $Bi^{3+}$, and 0.5 μM $Pb^{2+}$, respecivley.