Electronic Supplementary Information (ESI)

The DNA-Schiff Base Functional Nanopore Sensing Platform for Highly Sensitive Detection of Al^{3+} and Zn^{2+} ions

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1. Ionic currents measurement device

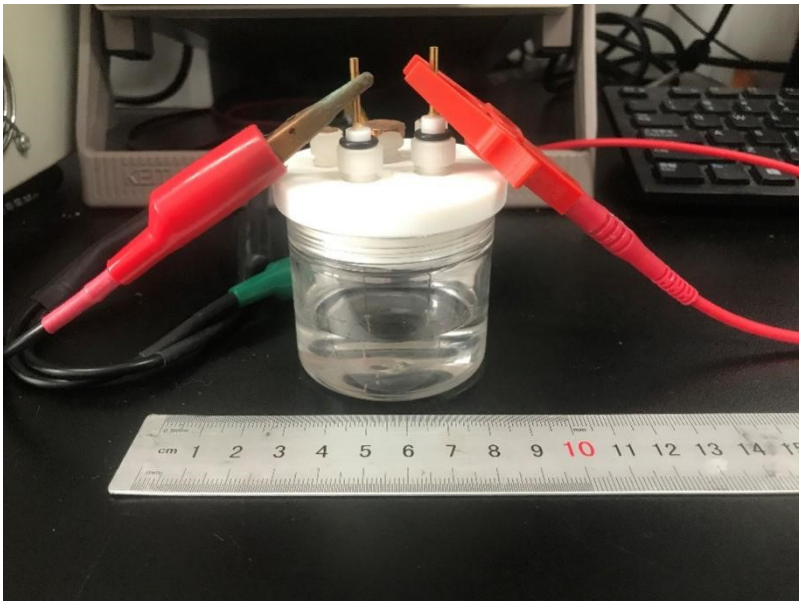

Fig. S1 Ionic currents measurement device.

2. Synthesis and Characterization of F1

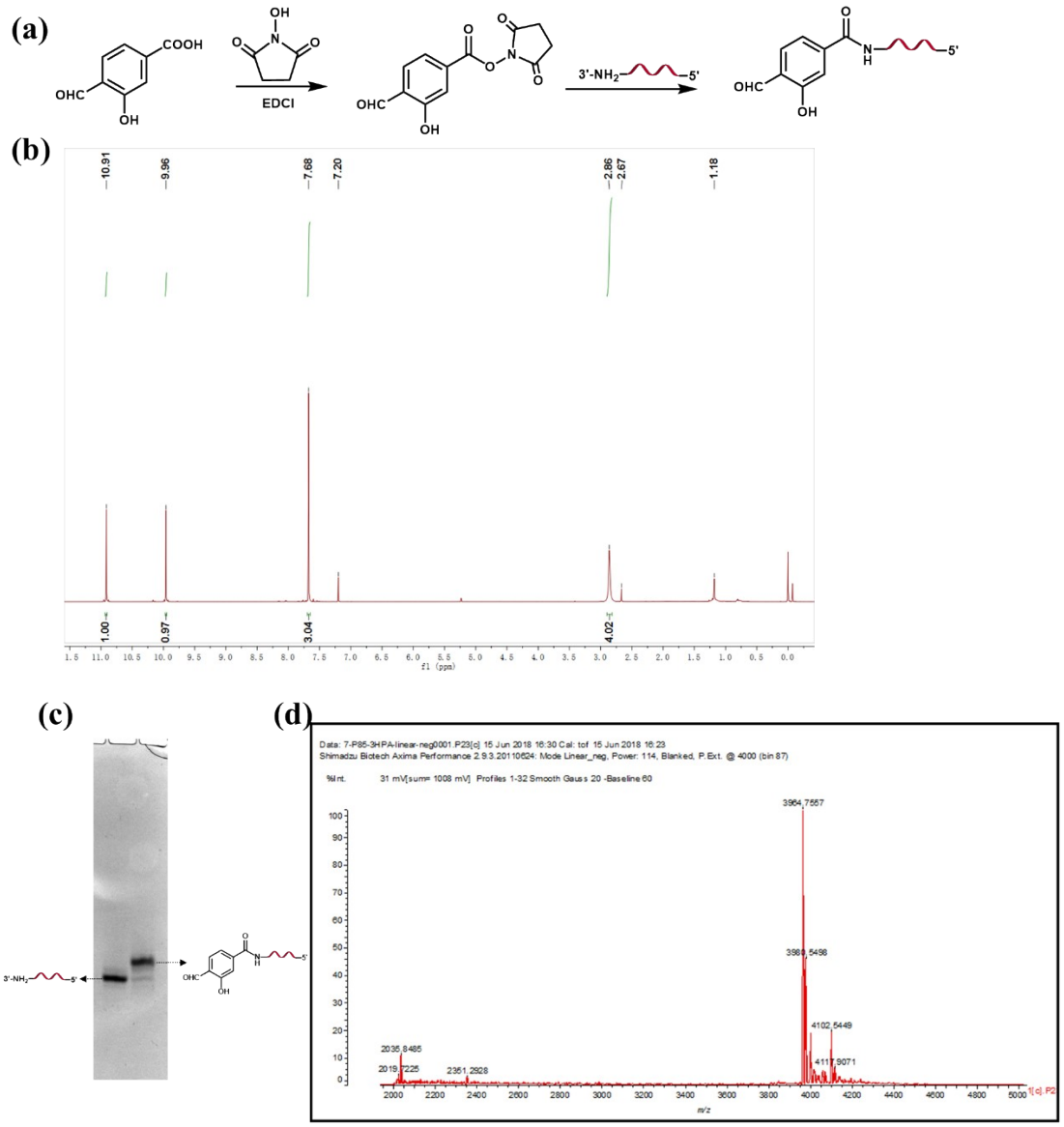

Fig. S2 (a) Schematic synthesis of F1. (b) 1H NMR spectra of 2,5-dioxopyrrolidin-1-yl 4-formyl-3-hydroxybenzoate. (c) F1 and raw DNA were characterized using 10% polyacrylamide gel electrophoresis in the native conditions. (d) Matrix-Assisted Laser Desorption/Ionization Time of Flight Mass Spectrometry (MALDI-TOF-MS) spectra of F1.

3.TEM Characterization of DNA Nanocube and DNA Network

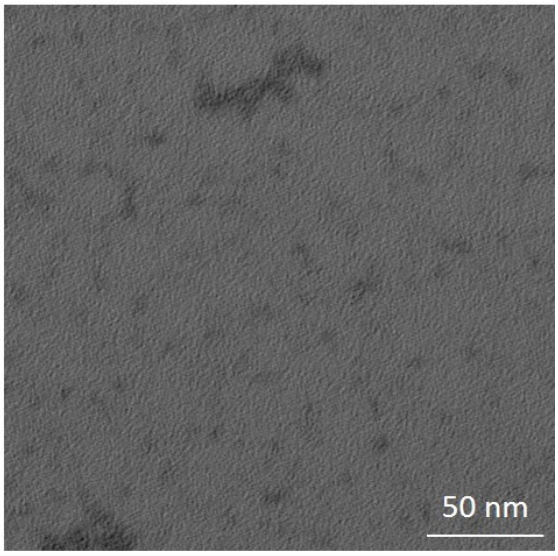

Fig. S3 TEM image of DNA nanocube.

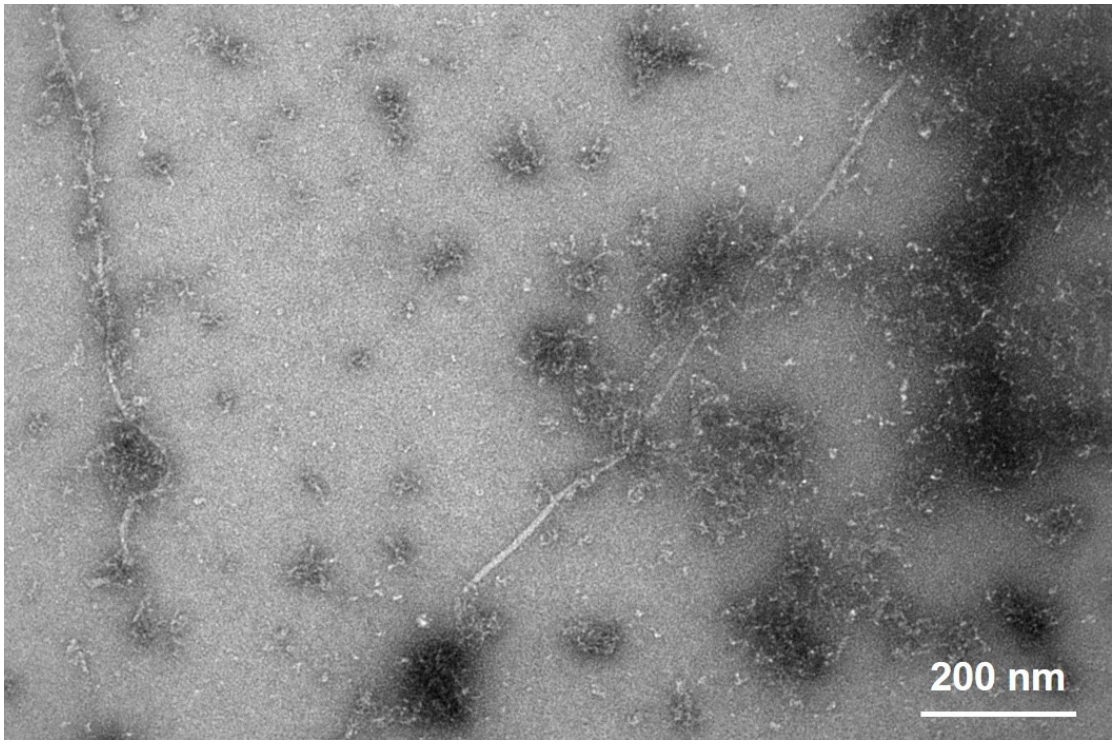

Fig. S4 TEM image of the assemblies from two DNA cubes (cube+4L_1， cube+4L_2).

4. SEM Characterization of the Glass Nanopipette and Electrochemical Measurement

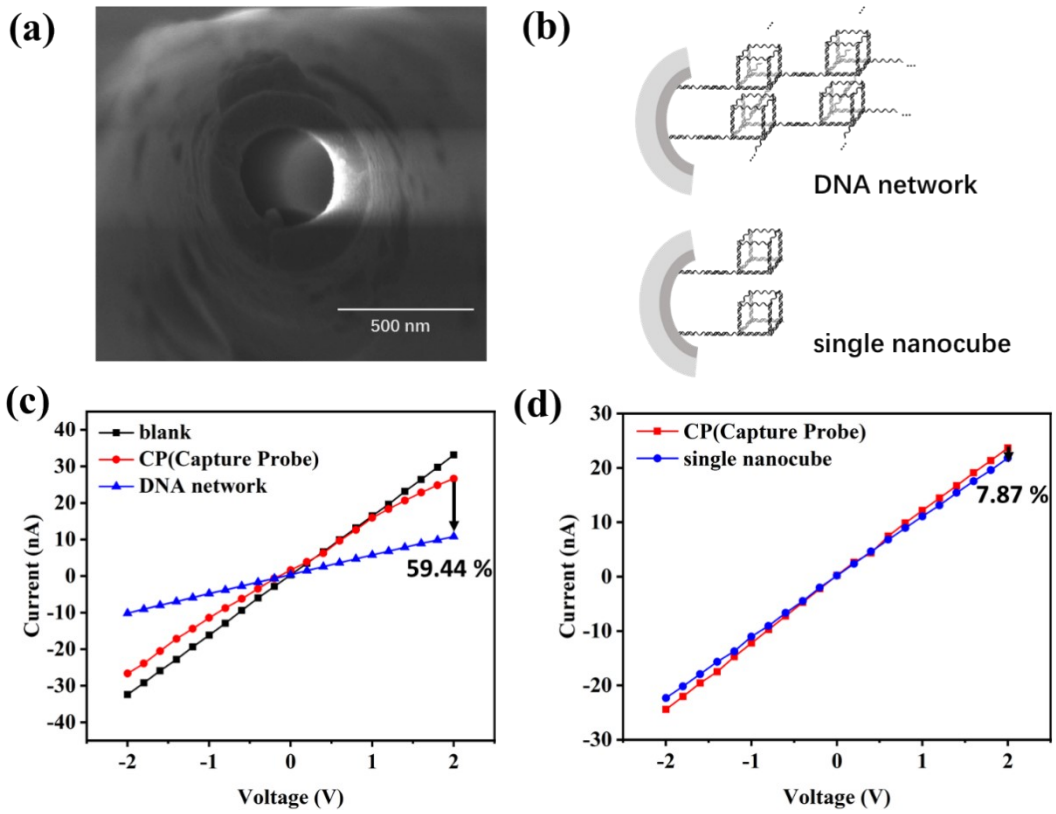

Fig. S5 (a) SEM of blank GN. (b) The contrast diagram of DNA network and single nanocube modified in GN. (c) Corresponding I-V curves during GN modification of the DNA network (blank, CP (Capture Probe) and DNA network). (d) Corresponding I-V curves during GN modification of the single nanocube (CP (Capture Probe) and single nanocube).

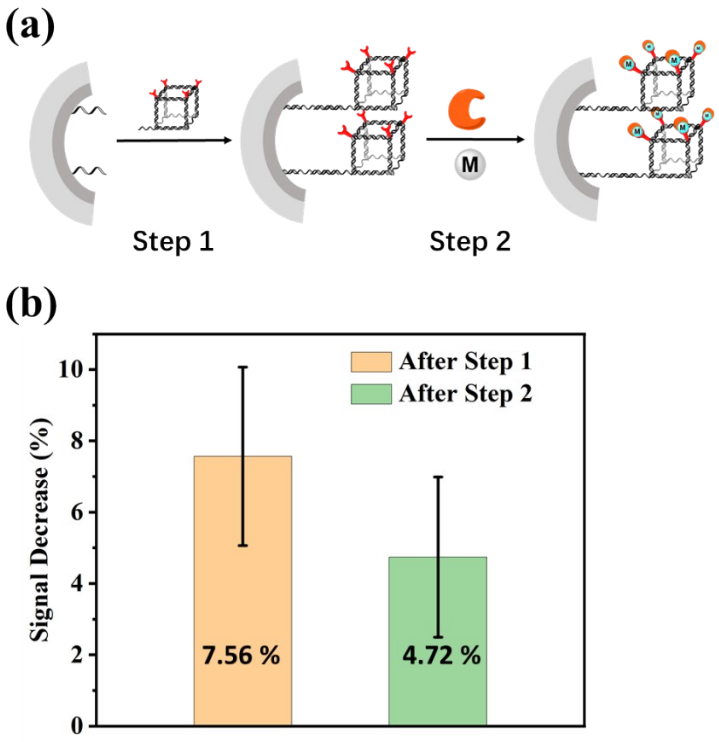

Fig. S6 (a) Schematic diagram of F1-decorated DNA nanocube modification process and Zn^{2+} response in GN. (b) The corresponding current signal drop rate during the modification of F1-decorated DNA nanocube and Zn^{2+} response in GN (Zn^{2+}, 10^8 fM; Tris-HCl, 10 mM, pH =7.4).

5. Fluorescent Measurement

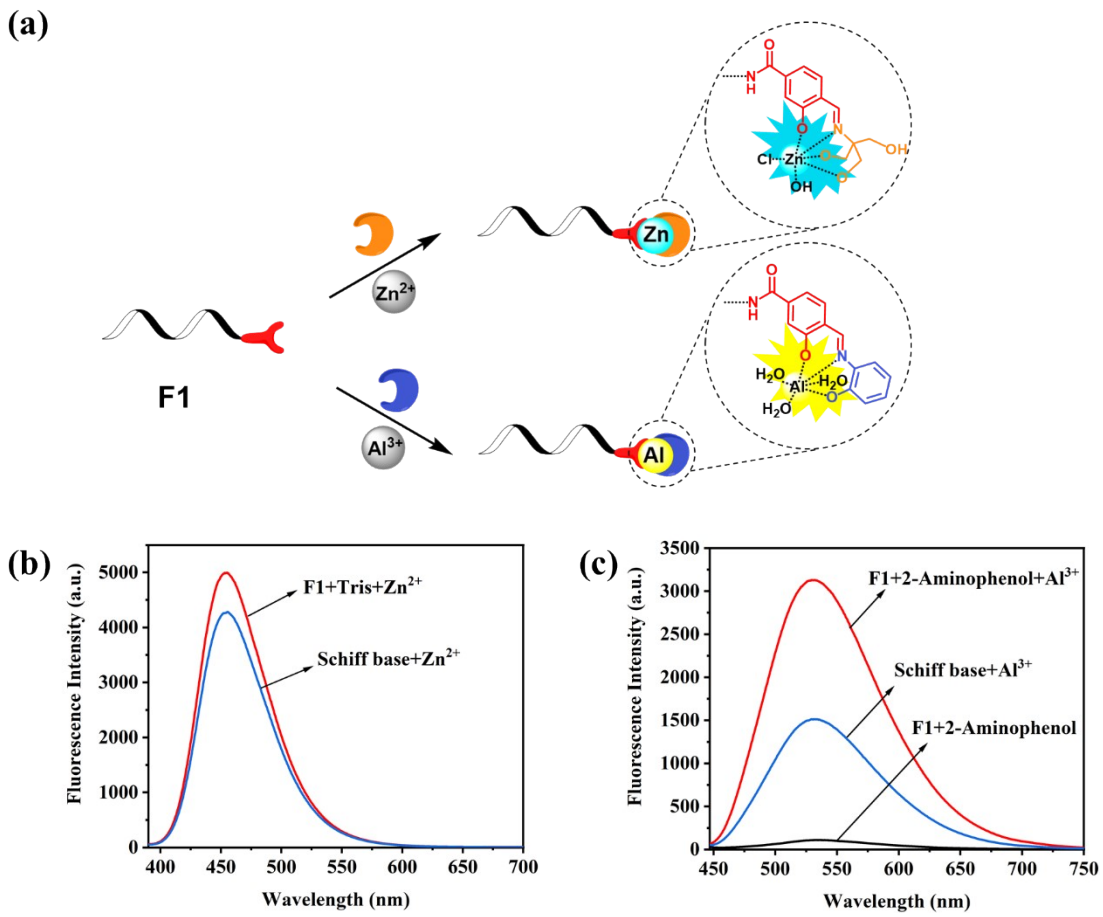

Fig. S7 (a) The synthetic scheme of the functional DNA Shiff base fluorescent probe with the ability to capture different metal ions. (b) Fluorescence emission spectra of mixture of F1+Tris+Zn^{2+} and mixture of Schiff base and Zn^{2+}. (F1, 20 μM; Tris 10 mM, pH = 7.4; Zn^{2+} 200 μM) (c) Fluorescence emission spectra of mixture of F1+2-aminophenol+Al^{3+} and mixture of Schiff base and Al^{3+} (F1, 20 μM; 2-aminophenol, 10 mM; Al^{3+} 200 μM).

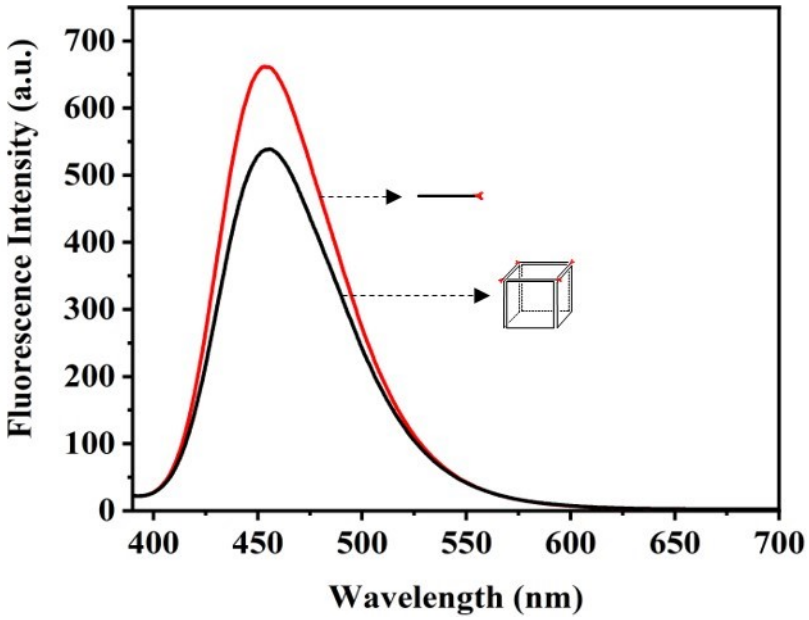

Fig. S8 Fluorescence emission spectra obtained for 4F1 @cube+Tris (F1, 6.4 μM; cube, 1.6 μM; Tris-HCl, 10 mM, pH = 7.4) in aqueous solution after the addition of Zn^{2+}(64 μM).