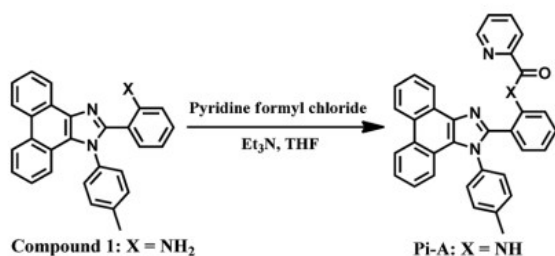


Supporting information for

Electrochemical Sensor for Highly Sensitive Detection of Copper Ion Based on a New Molecule
Probe Pi-A Decorated on Graphene

Scheme S1. Synthesis route of Pi-A



S1: The main synthesized procedure and characterization for Pi-A.

Pi-A was synthesized by the following steps: Firstly, picolinic acid (1.23 g, 10.00 mmol) was dissolved in SOCl₂ (20 mL), and the reaction mixture was refluxed for 5 h under N₂ atmosphere. After removing the excess SOCl₂, the obtained oily liquid was dissolved in CH₂Cl₂ (10 mL) and cooled in the ice-water bath. Then, the corresponding solution was slowly added into CH₂Cl₂ solution (30 mL) containing phenanthroimidazole derivatives (0.50 g, 1.25 mmol) and triethylamine (2.54 g, 25.08 mmol). After stirring for 8 h, the reaction mixture was washed with water (100 mL). Subsequently, the organic layer was separated, dried with anhydrous Na₂SO₄, filtered and concentrated. The crude product was purified by silica gel column chromatography (15: 1, petroleum ether: ethyl acetate, V/V) to give the probe Pi-A as a yellow solid (0.39 g, 61% yield). ¹H NMR (500 MHz, CDCl₃): δ 13.50 (s, 1H), 9.22 (d, *J* = 7.5 Hz, 1H), 8.84 (d, *J* = 8.3 Hz, 1H), 8.79 (d, *J* = 8.4 Hz, 1H), 8.75 (d, *J* = 8.4 Hz, 1H), 8.55 (d, *J* = 4.3 Hz, 1H), 8.29 (d, *J* = 7.8 Hz, 1H), 7.91-7.79 (m, 2H), 7.72 (t, *J* = 7.1 Hz, 1H), 7.52 (ddd, *J* = 8.3, 6.0, 2.1 Hz, 1H), 7.41-7.34 (m, 6H), 7.29 (dd, *J* = 10.2, 4.7 Hz, 2H), 7.08 (dd, *J* = 7.8, 1.1 Hz, 1H), 6.86 (t, *J* = 7.5 Hz, 1H), 2.53 (s, 3H). ¹³C NMR (126 MHz, CDCl₃): δ 163.28, 150.80, 148.44, 147.94, 139.94, 137.99, 137.17, 136.82, 135.76, 130.73, 129.71, 129.68, 129.43, 128.83, 128.52, 127.72, 127.14, 126.34, 126.08, 125.75, 125.04, 124.07, 123.23, 123.12, 122.60, 122.50, 121.67, 121.18, 118.91, 21.42. MS (EI) *m/z*: 504.40 (M⁺).

Fig. S1. ^1H NMR spectrum of Pi-A (500 MHz, CDCl_3).

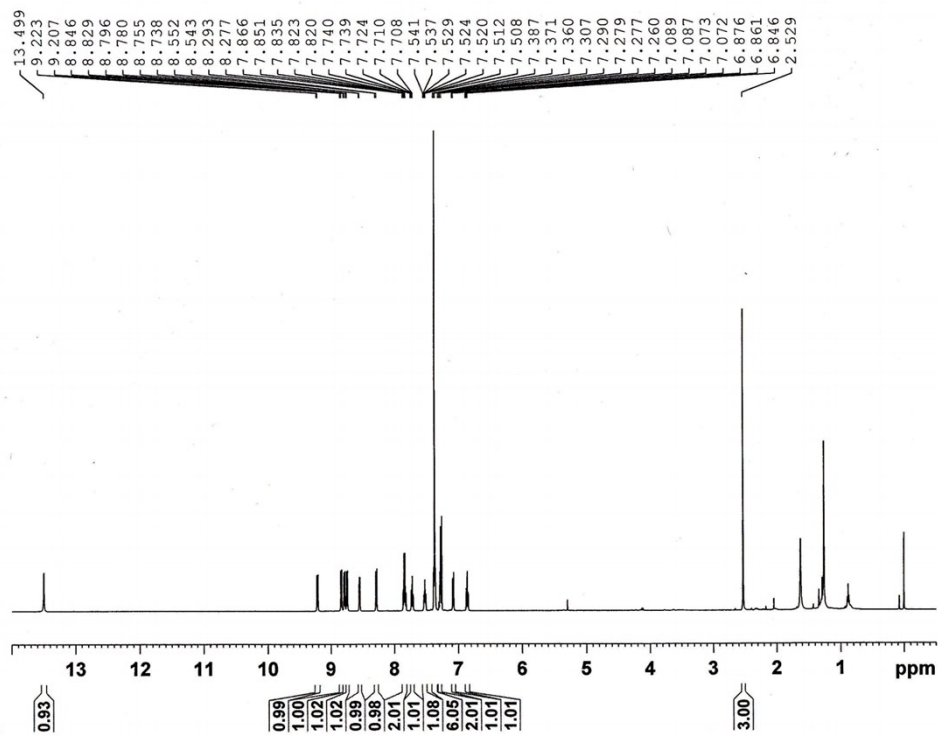


Fig. S2. ^{13}C NMR spectrum of **Pi-A** (126 MHz, CDCl_3).

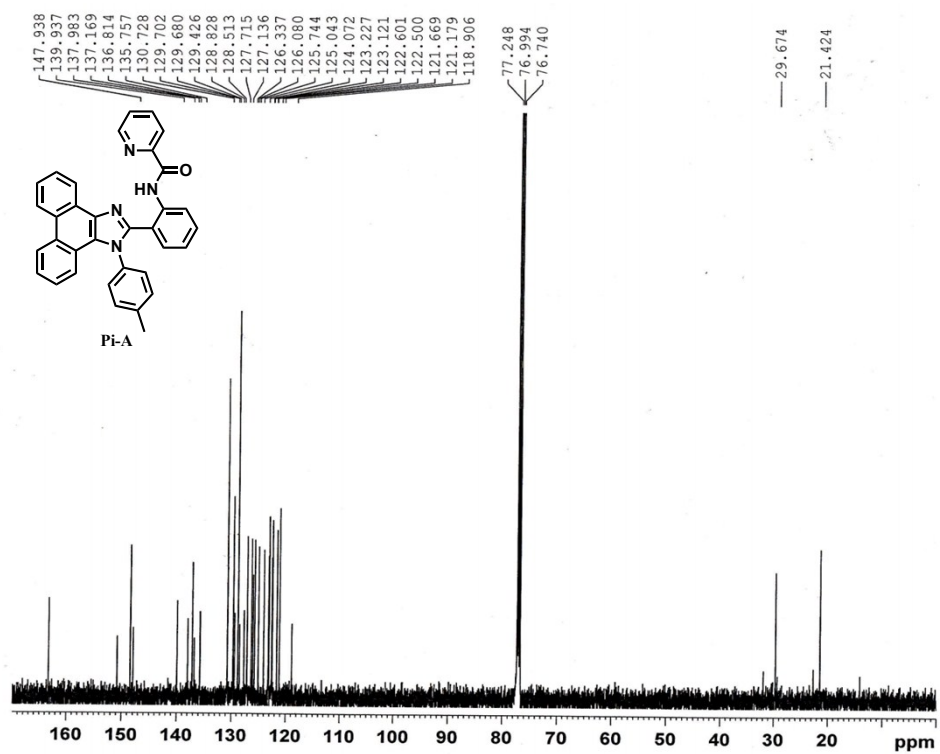


Fig. S3. ESI-MS spectrum of Pi-A.

