

# Supporting Information

A novel self-enhanced electrochemiluminescence immunosensor based on hollow Ru-SiO<sub>2</sub>@PEI nanoparticles for NSE analysis

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1. Zeta potential of Ru-SiO<sub>2</sub> and Ru-SiO<sub>2</sub>@PEI nanoparticles

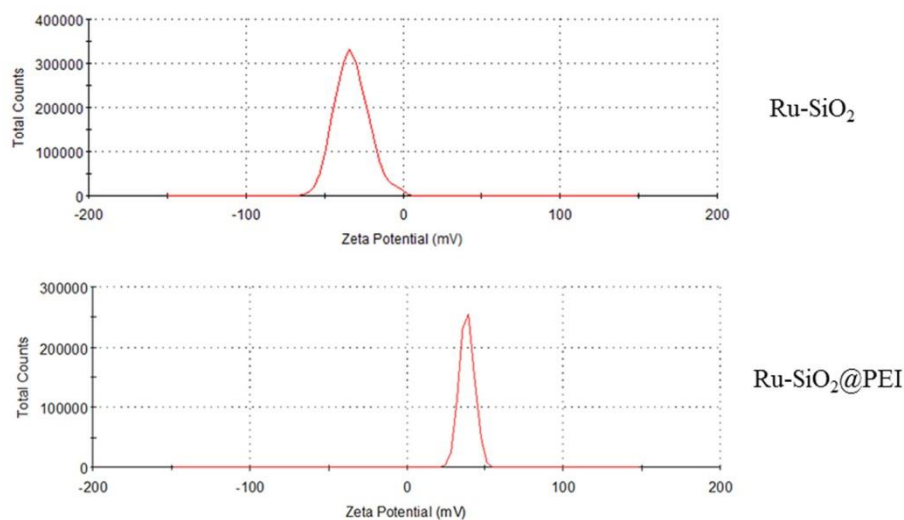


Figure S1 Zeta potential of Ru-SiO<sub>2</sub> and Ru-SiO<sub>2</sub>@PEI nanoparticles

2. Nitrogen adsorption-desorption isotherm and BJH pore size distribution of Ru-SiO<sub>2</sub> and Ru-SiO<sub>2</sub>@PEI nanoparticles

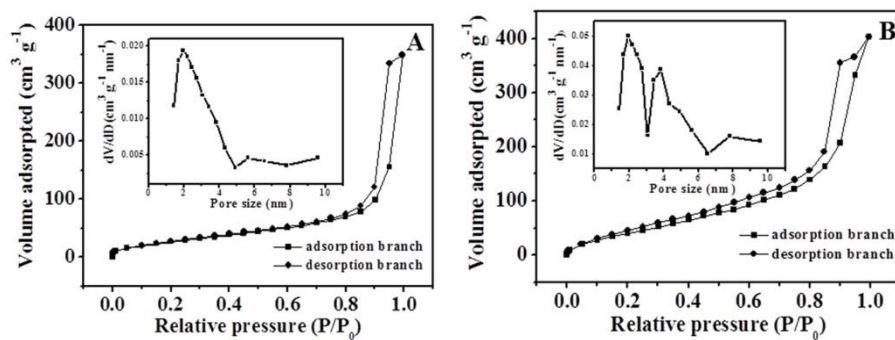


Figure S2 Nitrogen adsorption-desorption isotherm for Ru-SiO<sub>2</sub> and Ru-SiO<sub>2</sub>@PEI nanoparticles. Inset: BJH pore diameter distribution.

3. TEM images of Ru-SiO<sub>2</sub>@PEI nanoparticles by interacting Ru-SiO<sub>2</sub> nanoparticles with different concentration of PEI

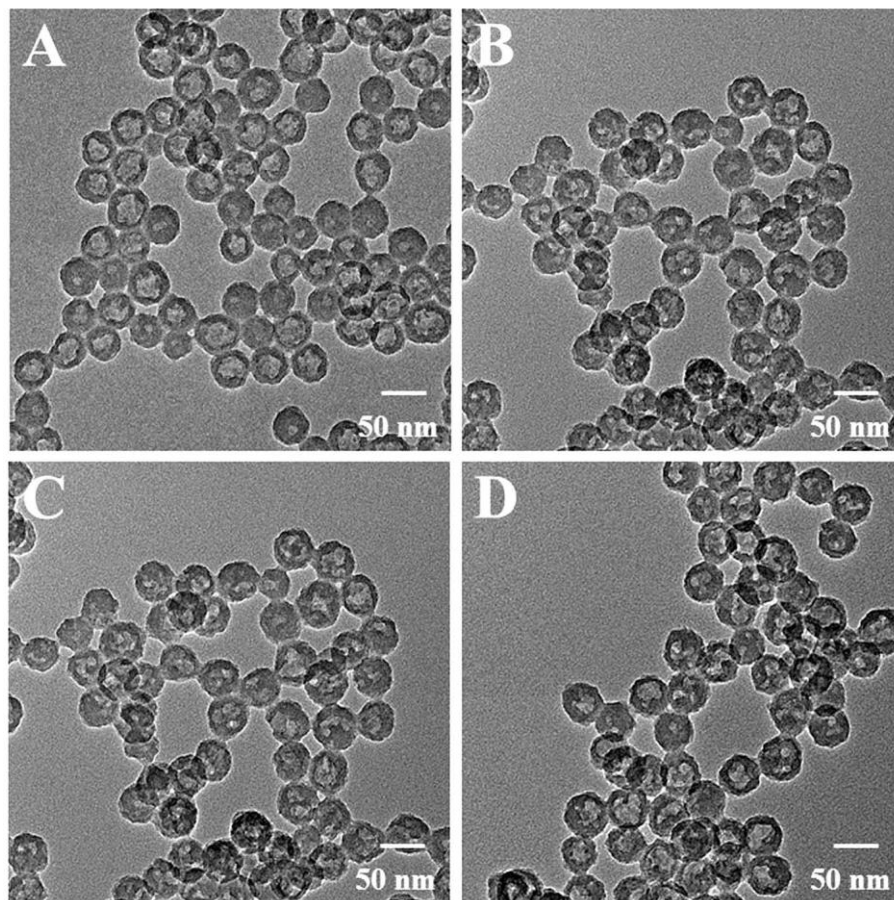


Figure S3 TEM images of Ru-SiO<sub>2</sub>@PEI nanoparticles by interacting Ru-SiO<sub>2</sub> nanoparticles with (A) 5 mg mL<sup>-1</sup>, (B) 15 mg mL<sup>-1</sup>, (C) 25 mg mL<sup>-1</sup> and (D) 40 mg mL<sup>-1</sup> PEI for 12h.

#### 4. Optimization of experimental parameter

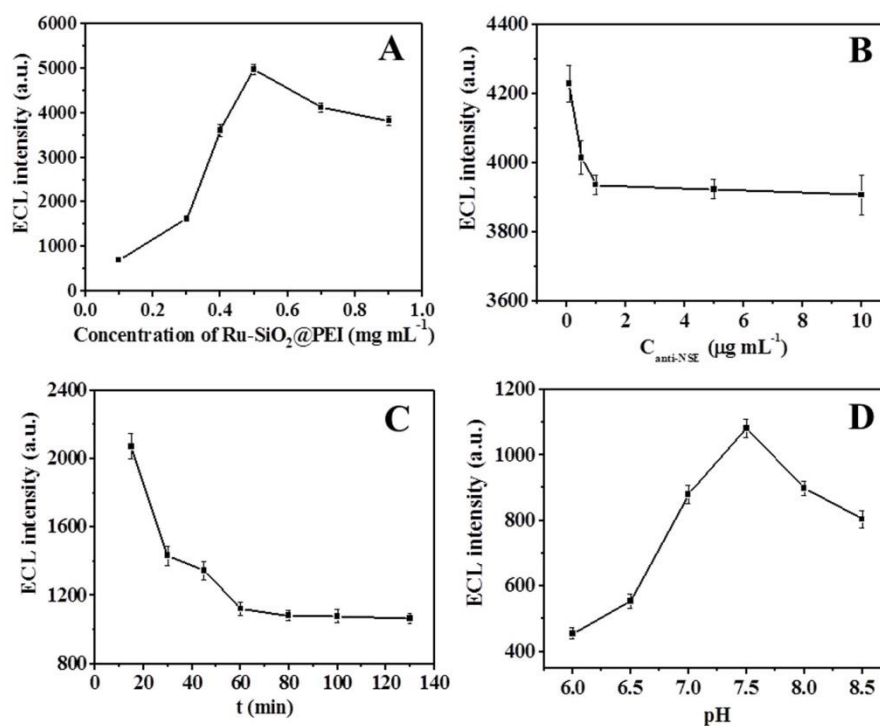


Figure S4 The effects of (A) concentration of Ru-SiO<sub>2</sub>@PEI nanoparticles, (B) the concentration of the anti-NSE, (C) incubation time and (D) pH value on the ECL intensity. The immunosensor was incubated with  $1.0 \times 10^{-9}$  mg mL<sup>-1</sup> NSE antigen. The ECL response was determined in 0.1M PBS (pH 7.5); Scan rate: 100 mV s<sup>-1</sup>. Scan potential: 0~1.35V