

Observation of Anodic Electrochemiluminescence from Silicon Quantum Dots for the Detection
of Hydrogen Peroxide

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Experiential Section.

Synthesis of Si QDs. Similar to our previously reported protocol, the fabricating of silicon quantum dots colloids are obtained by chemical etching.^{S1,S2} The etching liquid is the mixture of HF (40%) and deionized water (V:V 1:5). Then, 8 g Si powders are added into 20 ml of the etching liquid. After 20 minutes etching, the liquids on top are abandoned and the rest Si powders are washed at least 3 times with ionized water, until the pH value of water increases over 6. Finally, the powders are added into 20 ml ionized water or ethanol, and are ultrasonic treated for 20 minutes. The prepared Si quantum dots are dispersed in water or ethanol.

Characterization of QDs. The size and morphology of synthesized silicon QDs were recorded by transmission electron microscopy (TEM) with a JEOL model 2000 instrument operated at acceleration voltage of 200 kV. The synthesized silicon QDs were placed on copper TEM grid and drying for over 10 min in atmosphere. The high-resolution TEM (HR-TEM) measurements were acquired from a 300 kV field emission transmission electron microscope. The synthesized silicon quantum dots for HR-TEM analyses were drop-casted from dilute dispersions of Si QDs in ultrathin-carbon (<10 nm thickness)-coated copper grids. The PL spectrum was measured by Photoluminescence Spectrum (FS920, Edinburgh Instruments, England). The emission spectra of silicon QDs solution were monitored on excitation at given wavelength with quartz colorimetric dish. The excitation light source was Xenon lamp.

ECL Measurements. The ECL signals were measured with a photomultiplier tube (PMT) installed under the electrochemical cell. The ECL intensity-potential curves and cyclic voltammetry (CV) curves were recorded with a three-electrode system with an ITO working electrode, an Ag wire quasi-reference electrode, and a Pt counter electrode. ECL tests were performed in phosphate buffered saline (PBS pH 7.4) containing 0.1 M tri-n-propylamine (TPA) or potassium persulfate ($K_2S_2O_8$) as co-reactants. In addition, ECL generation of silicon QDs under different concentrations of H_2O_2 was investigated.

Figure S1. The HR-TEM image of the synthesized Si QDs

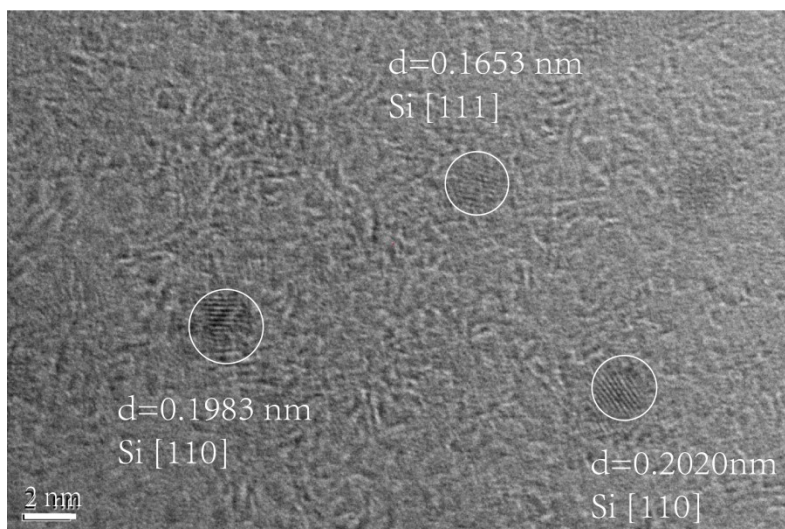
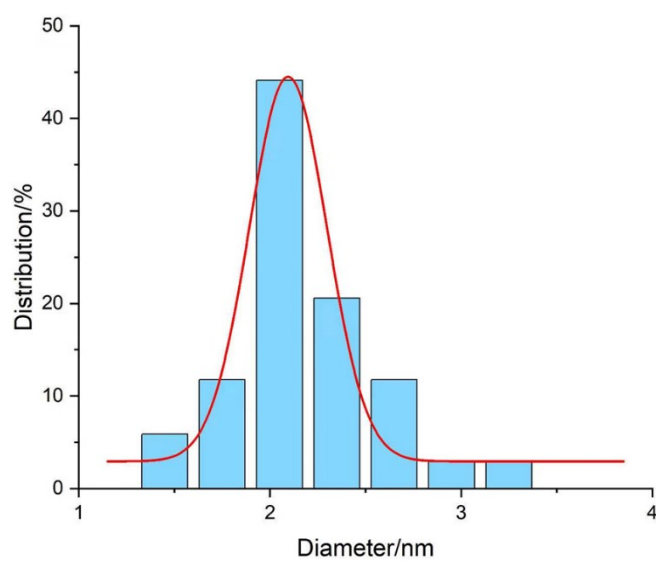


Figure S2. The DLS data of the Si QDs



Reference.

S1. J. Wang, J. H. Guo and J. Chen, *Sensors*, 2017, **17**, 2396.

S2. J. Wang, S. J. Xiong, X. L. Wu, T. H. Li, and Paul K. Chu, *Nano Lett.*, 2010, **10**, 1466.