Supplementary Material

Synthesis of N, Si co-doped carbon dots to establish fluorescent sensor for Hg(II) detection with triple signal output

Jun Zhou[1,2a], Chengyue Zou[1a], Danqun Huo[1], Chengxiang Chu[1], Shasha Liu[1], Mei Yang[1], Suyi Zhang[1,2b], Xianfeng Wang[1,3b], Changjun Hou[1,4 b]

[1] Key Laboratory for Biorheological Science and Technology of Ministry of Education, Bioengineering College of Chongqing University, Chongqing 400044, PR China

[2] National Engineering Research Center of Solid-State Brewing, Luzhou Laojiao Group Co. Ltd., Luzhou 646000, PR China

[3] Wuxi School of Medicine, Jiangnan University, Wuxi 214122, PR China

[4] Chongqing Key Laboratory of Bio-perception & Intelligent Information Processing, School of Microelectronics and Communication Engineering, Chongqing University, Chongqing, 400044, PR China

[a] Jun Zhou and Chengyue Zou contributed equally to this article

[b] Corresponding authors

E-mail addresses:

houcj@cqu.edu.cn (C.J. Hou); wxfeng@jiangnan.edu.cn (X.F. Wang); zhangsy@lzlj.com (S.Y. Zhang)

Tel: +86 23 6510 2507

Optimizations

To achieve the optimal detecting performances, the key experimental parameters like pH and response time were analyzed. As can be seen from Fig. S2A, the net fluorescent response presents the first increase and then decrease, and it reaches to the maximum under the pH of 4.5. On one hand, carboxy and amino on N, Si/CQDs will be protonated under lower pH conditions (pH $<$ 4.5), which weakens the fluorescence of N, Si/CQDs. On the other hand, Hg(II) will be hydrolyzed under higher pH conditions (pH $>$ 4.5), resulting in the weak chelation between mercury ions and N, Si/CQDs. Therefore, pH of 4.5 is chosen for further experiments. As shown in Fig. S2B, the fluorescence response gradually increases with the expansion of reaction time from 1 to 10 min. However, no obvious enhanced response is observed after 10 min. Thus 10 min is enough to obtain the reaction equilibrium, which is considered as the optimal time for Hg(II) detection.

Fig. S1

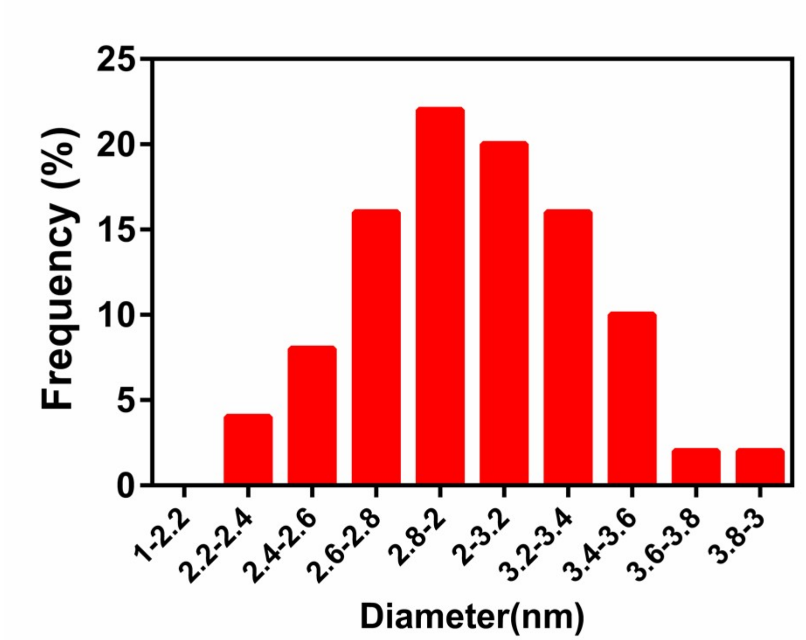

Fig. S1 Size distribution of Si, N/CQDs

Fig. S2

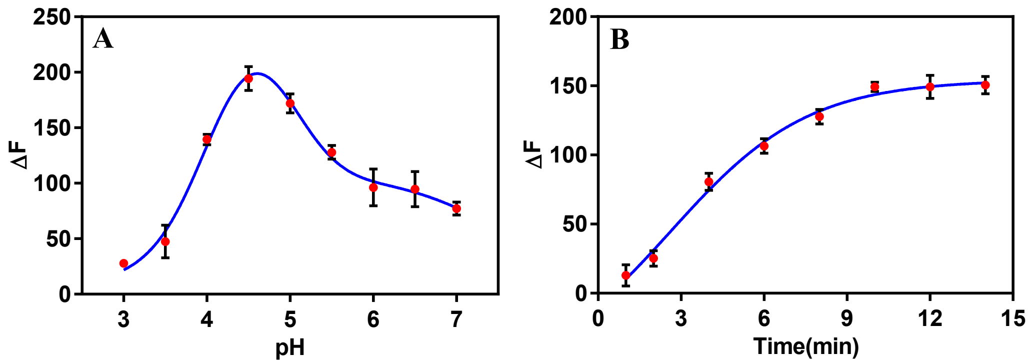

Fig. S2 The influences of pH (A) and reaction time (B) for Hg(II) sensing

Fig. S3

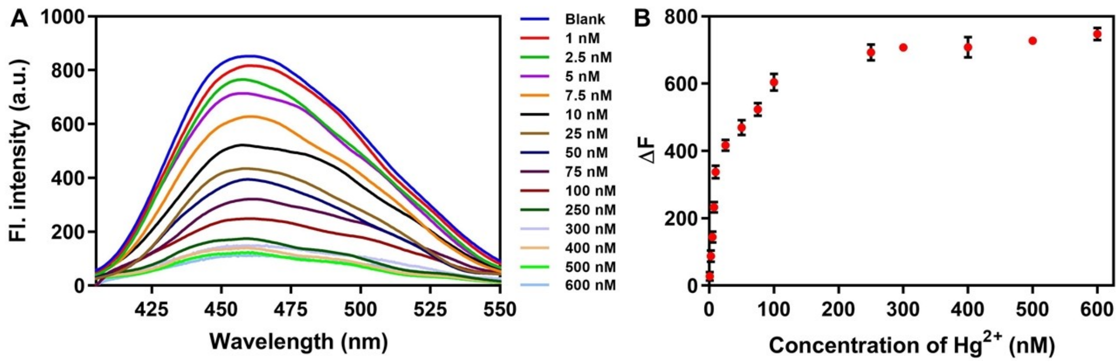

Fig. S3 Fluorescence intensity (A) and fluorescent reduction (B) of N, Si/CQDs induced by various concentrations of Hg(II). Hg(II) concentrations: 1, 2.5, 5, 7.5, 10, 25, 50, 75, 100, 250, 300, 400, 500 and 600 nM.

Fig. S4

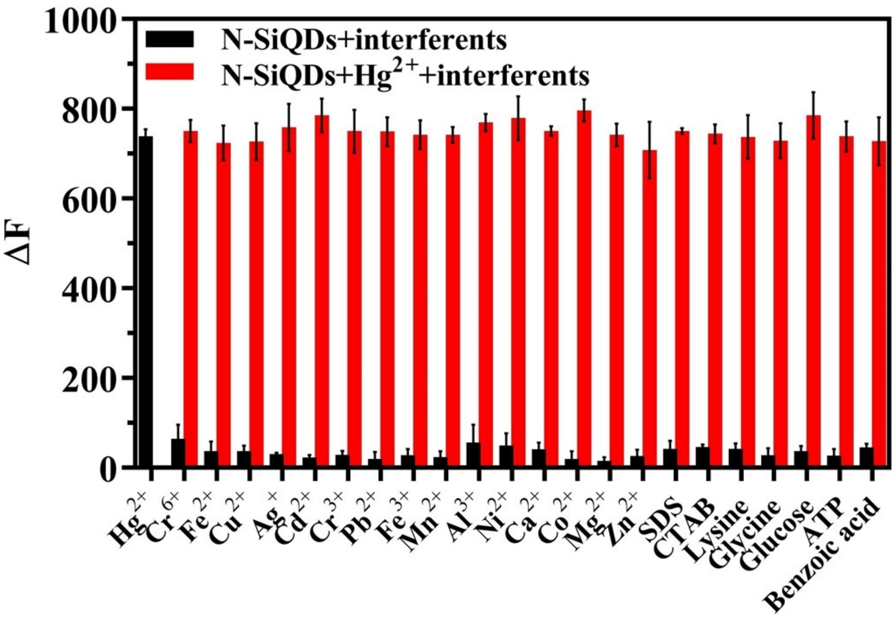

Fig. S4 The net fluorescence response of N, Si/CQDs nanoprobe towards different kinds of interferents. (Hg^{2+}: 250 nM; Other interferents: 10 μM)