Supporting information

**In-Situ** Synthesis of Gold Nanoclusters in Hydrogels Enables Capillary-Based Portable Fluorescence Analysis of Hypochlorite in Environmental Samples

Cui Zheng Peng,†,◆ Hang Zhang,†,◆ Ningning Pi,‡ Xinyu Li,‡ Qingling Yang,‡ Hao Lin Zou,† Hong Qun Luo,† Nian Bing Li,† and Bang Lin Li*,†

† Key Laboratory of Luminescence Analysis and Molecular Sensing (Southwest University), Ministry of Education, School of Chemistry and Chemical Engineering, Southwest University, Chongqing 400715, P. R. China.
‡ Key Laboratory of Organic Pollutants in Environmental Chemical Behavior and Ecological Toxicology of Chongqing & Chongqing Ecological and Environmental Monitoring Center, Chongqing, 401147, P. R. China
◆ C.Z.P. and H.Z. contributed equally to this work.

*Email address: B. L. Li (chemlibl@swu.edu.cn)
Figure S1. The gel base in the left vial is doped with HAuCl$_4$ and BSA, and the gel base in the right vial is doped with BSA only. After incubation with an alkaline solution (pH=12.8) at 60 °C for 30 min, this phenomenon in the sample bottle occurred.

Figure S2. The fluorescence emission spectra (above panel) and photographs (below panel) of the Au NCs aqueous solution and Au NCs embedded in hydrogel under the excitation of 360 nm.
Figure S3. The nano-staining hydrogels were treated at different temperatures for 1 h. The results indicate that the boundary between the aqueous solution and the hydrogel disappears at the temperature of 90 °C.

Figure S4. The nanoparticles appeared in reaction hydrogels at room temperature for 20 days without presence of OH⁻.
**Figure S5.** After mixing a specific concentration of BSA aqueous solution with a particular concentration gradient of NaClO solution, the change trends of fluorescence intensity of the mixed solutions at 425 nm.

**Figure S6.** The supplementary mechanism of fluorescence responses to high-concentration ClO\(^-\) using the fluorescent Au NCs staining hydrogels sensory strategy.
Figure S7. The fluorescence responses of the nano-staining hydrogels in the absence and presence of ClO⁻ (5.0 mM) after the loading hydrogels had been prepared for different days.

Figure S8. The fluorescence changes of pre-synthetic BSA-Au NCs to different concentrations of Fe³⁺ ions in various pH conditions.
Figure S9. The fluorescence responses of Au NCs-staining hydrogels to ClO\textsuperscript{-} in the presence of NaCl with different concentration ratios (ClO\textsuperscript{-}: NaCl).