

Electronic Supplementary Information

Highly sensitive, selective and reusable mercury (II) ions sensor based on ssDNA-functionalized photonic crystals film

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Synthesis of Poly(Styrene-Acrylamide) colloidal microspheres:

Monodisperse Poly(Styrene-Acrylamide) (P(St-AM)) colloidal latex microspheres with different diameters were synthesized by batch emulsion polymerization, using a modified procedure. Briefly, Styrene (20 g) and sodium oleate (0.03 g) were dispersed to the solution containing NaHCO₃ (0.2 g), NaCl (0.02 g) and H₂O (96 g), by stirring at 300 rpm for 30 min. Then acrylamide (1g) which firstly dissolved in H₂O of 2 g was added to the mixture, following with stirring and bubbling with nitrogen for 30 min at room temperature. Different amount ammonium persulfate of dissolved in H₂O of 2 g was added when the temperature of reaction mixture was elevated to 60 °C. The polymerization temperature was kept at 80 °C for 8 h with continuously stirring. The resultant latex spheres with different diameters were obtained and can be used directly without purification.

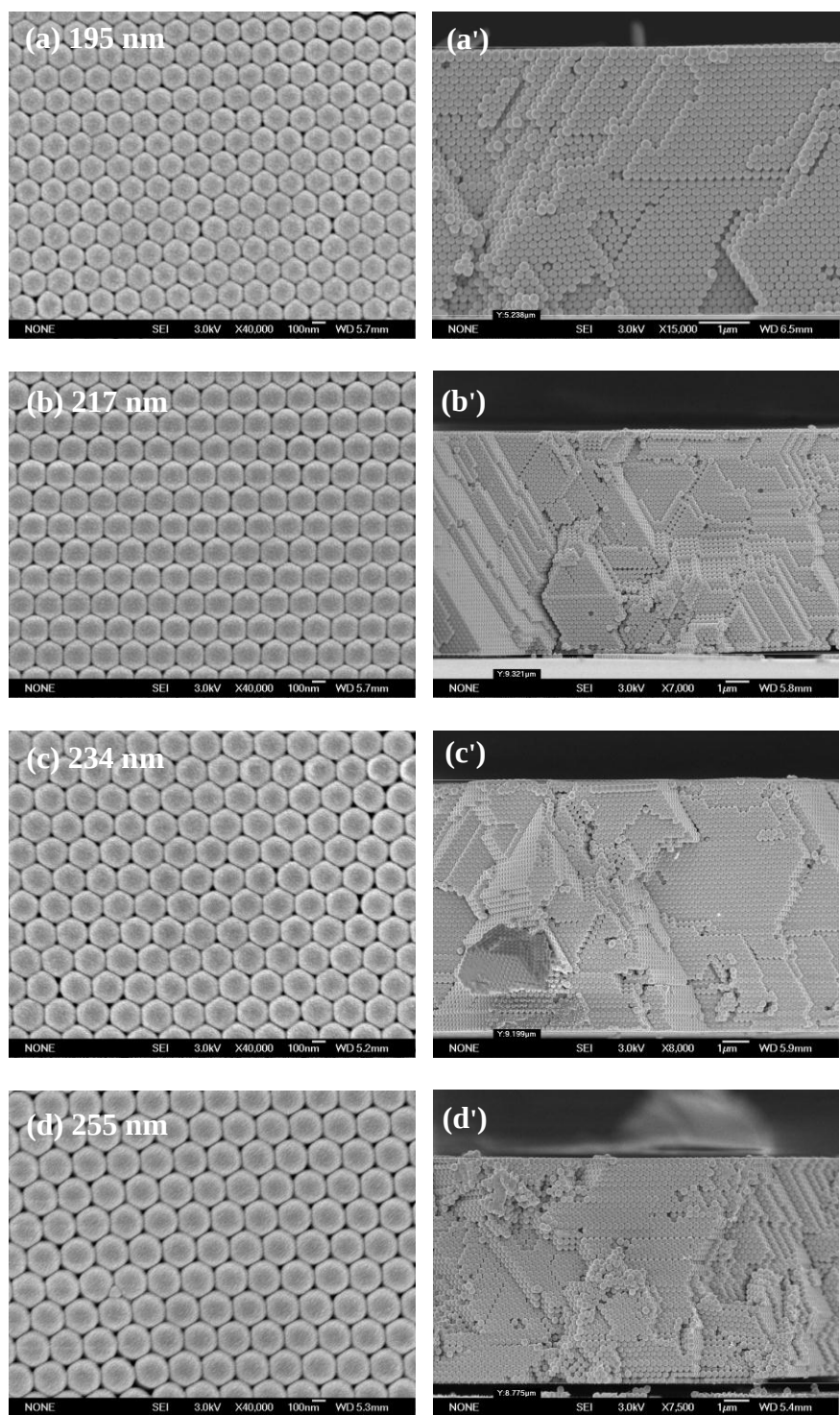


Fig. S1 The top-view SEM images of PCs films prepared from the P(St-AM) microspheres with diameters of 195 (a), 217 (b), 234 (c) and 255 nm(d). The corresponding cross-sectional SEM images were shown in a' to d', respectively.

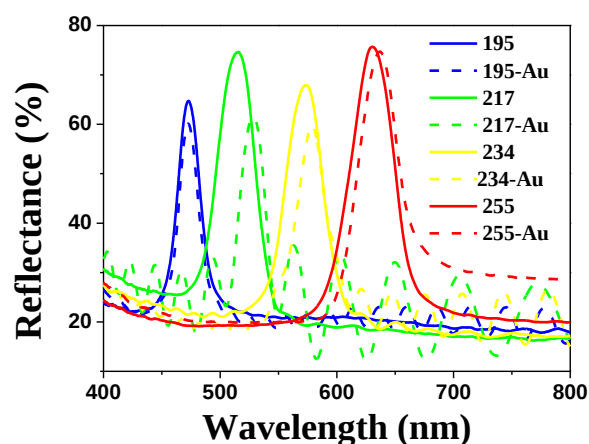


Fig. S2 The reflectance spectra of PCs films prepared from the P(St-AM) microspheres (solid line) with diameters of 195, 217, 234 and 255 nm, respectively, and the corresponding spectra after sputtering gold on the surface of the PCs films (dash line). The reflectance spectra were collected using a fiber-optic spectrophotometer (Ocean Optics, Inc., HR 4000 256 UV–Vis-NIR). All reflectance spectra were measured at the near-normal incidence to the (111) plane of the sample.

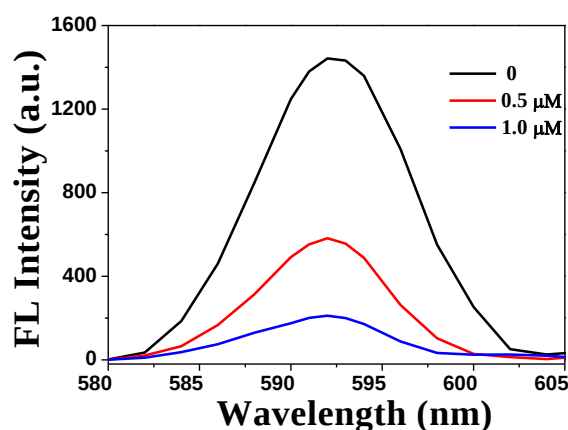


Fig. S3 The FL spectra of the ssDNA-PCs sensor reacted with the river water including Hg^{2+} ions with the concentration of 0 (black line), 0.5 (red line) and 1.0 μM (blue line) for 30 min ($\lambda_{\text{ex}} = 488 \text{ nm}$). Obviously, the fluorescence intensity decreases with adding Hg^{2+} ions to the original river water, which suggested that the prepared ssDNA-PCs sensor may be used for detecting Hg^{2+} ions in real water samples. The quenching efficiency of 60% and 85% were obtained for Hg^{2+} ions of 0.5 μM and 1.0 μM , respectively. The river water was obtained from Yanhe River, Shaanxi Province, China, and was first filtered to remove solids before detection.