

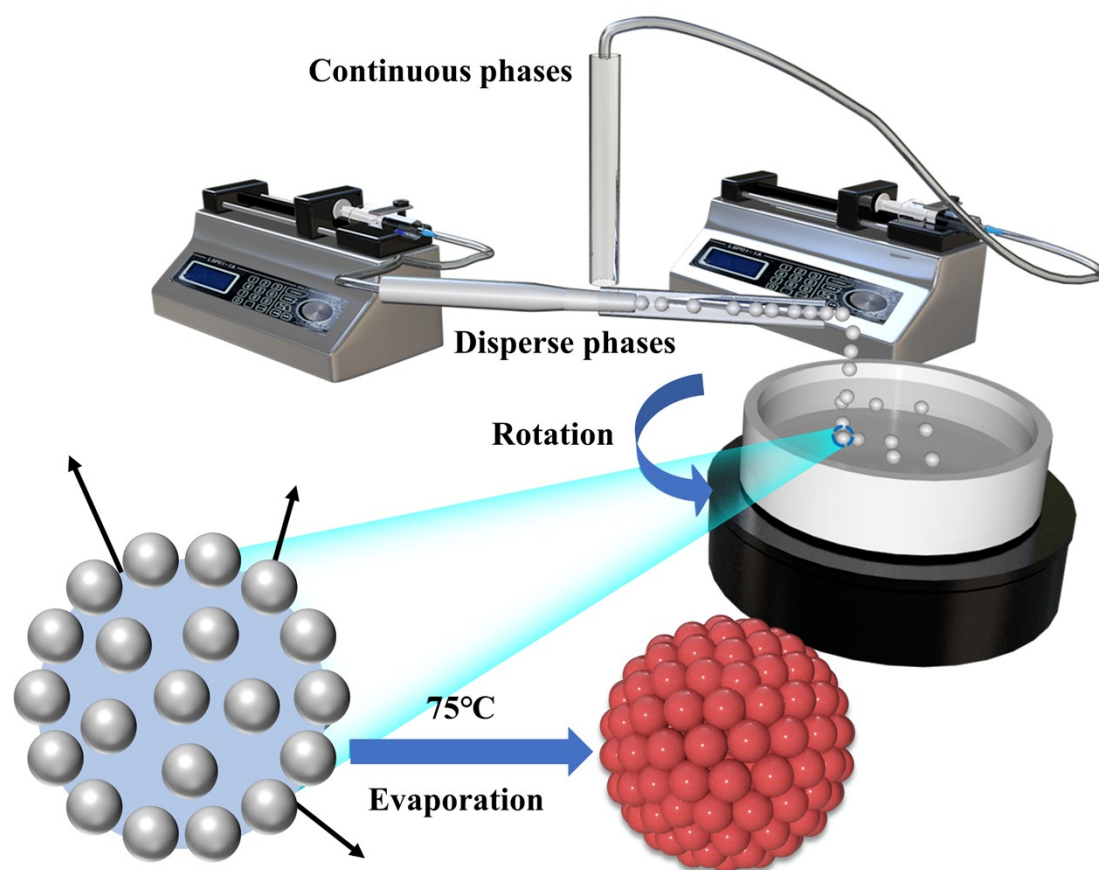
## Supplementary Information

# Interpenetrating Porous Photonic Crystal Balls for Rapid Naked Eye Detection of Uranyl Ions

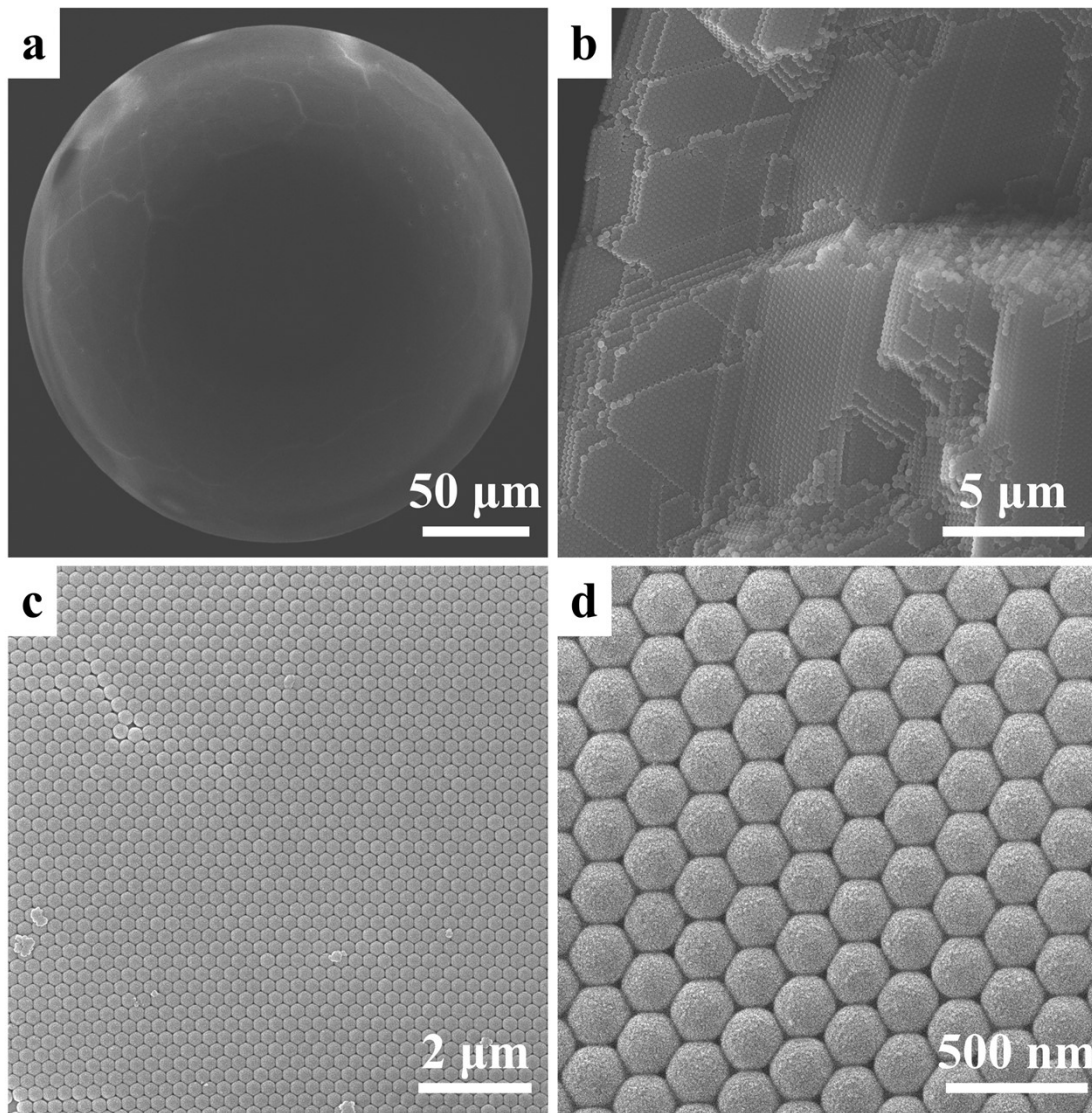
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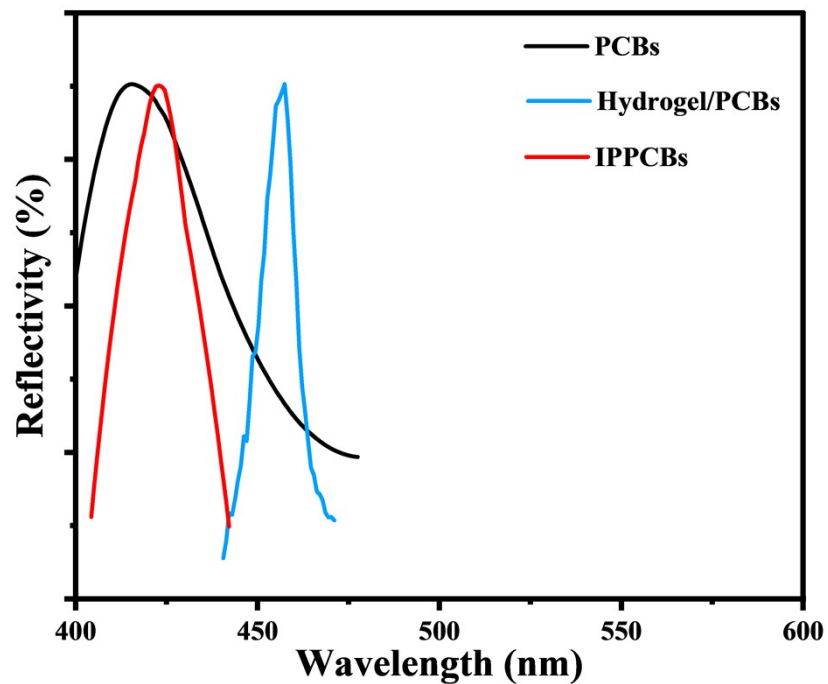
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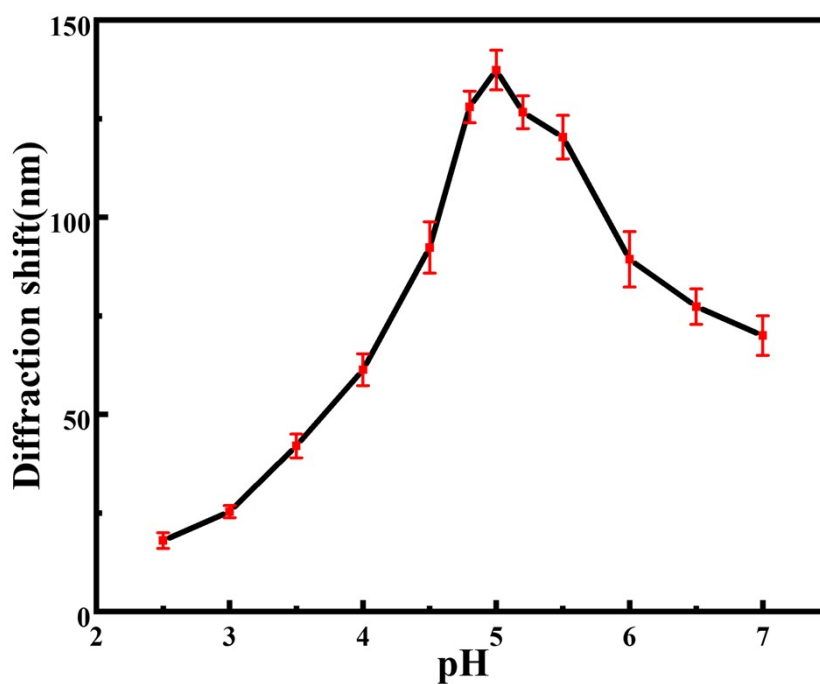
**Figure S1.** Schematic diagram of the preparation of photonic crystal balls templates via T-shaped microfluidic device.



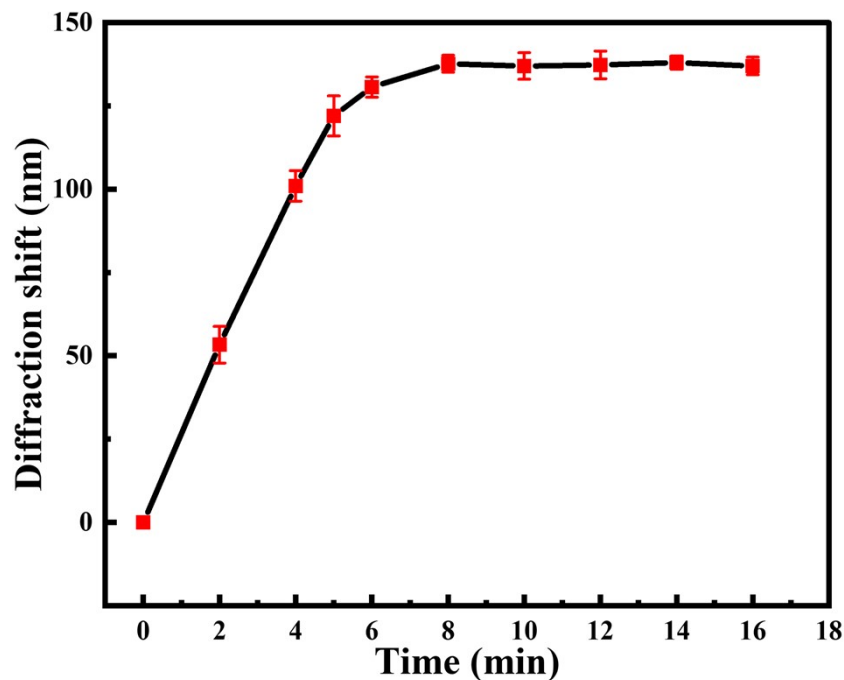
**Figure S2.** SEM images of photonic crystal balls template at different magnifications.



**Figure S3.** The corresponding reflectance spectrum of PCBs, hydrogel/PCBs and IPPCBs.



**Figure S4.** The effect of pH on the performance of IPPCBs in response to  $\text{UO}_2^{2+}$ . (The concentration of  $\text{UO}_2^{2+}$  used in the experiment is  $0.1 \mu\text{M}$ )



**Figure S5.** Optimization of reaction time of IPPCBs in response to  $\text{UO}_2^{2+}$ . (The concentration of  $\text{UO}_2^{2+}$  used in the experiment is  $0.1 \mu\text{M}$ )

**Table S1.** Comparison of different photonic crystal sensors for uranyl ion analysis.

Responsive group	Angle dependency	Sensor size	Linear range	Responding speed	Refs
Carboxy and amidoxime	None	Micron scale	1nM- 0.1 $\mu\text{M}$	12 min	This work
Carboxy	Yes	Centimeter scale	Not given	1 h	Ref.1
Carboxy and amidoxime	Yes	Centimeter scale	Not given	1 h	Ref.2
Amidoxime	Yes	Centimeter scale	1nM- 100 $\mu\text{M}$	40 min	Ref.3

## References

- [1] F. Xiao, Y. Sun, W. Du, W. Shi, Y. Wu, S. Liao, Z. Wu, R. Yu, Smart Photonic Crystal Hydrogel Material for Uranyl Ion Monitoring and Removal in Water, *Advanced Functional Materials* 27(42) (2017) 1702147.
- [2] F. Xiao, H. Li, P. Xie, J. Liu, W. Du, L. Li, S. Yang, Z. Wu, Colloidal templating of highly ordered porous amidoxime-functionalized hydrogel for intelligent treatment of uranium contaminated water, *Chemical Engineering Journal* 431 (2022) 134141.
- [3] Q. Chen, C. Wang, S. Wang, J. Zhou, Z. Wu, A responsive photonic crystal film sensor for the ultrasensitive detection of uranyl ions, *Analyst* 145(16) (2020) 5624-5630.