

## Sensitive ratiometric imprinted hydrogel for the detection of matrix metalloproteinase 7 (MMP7) biomarker

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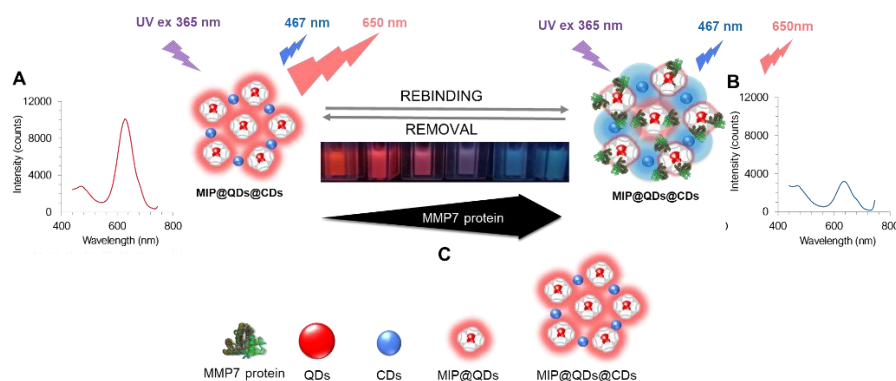
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A dual-emissive fluorescent probe has been developed for the sensitive and selective detection of matrix metalloproteinase 7 (MMP7), a protein biomarker associated with pancreatic cancer<sup>1,2</sup>. The resultant materials were designated as imprinted ratiometric hydrogels (imprinted rHG). The fluorescence quenching of the imprinted rHG occurred with increasing concentrations of MMP7, showing linearity in the range  $[1.49 \times 10^{-11} - 1.92 \times 10^{-9}]$  g/mL in 1000-fold diluted human serum in PBS 10mM pH 5.8. Overall, the imprinted rHG developed in this work presented increased selectivity for the MMP7 protein over raw emitting QDs nanoparticles and higher sensitivity comparatively to the non-imprinted rHG.



**Scheme 1:** Fluorescence emission spectra of the imprinted rHG developed in the absence (A) and in the presence (B) of the target protein MMP7 in 1000-fold diluted human serum; Color change observed of the imprinted rHG under 365nm UV light exposure, with increasing concentrations of MMP7 standards (C).

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### References

- 1 P. Chen, R. Selegård, D. Aili and B. Liedberg, Peptide functionalized gold nanoparticles for colorimetric detection of matrix metalloproteinase 7 (MMP-7) activity, *Nanoscale*, 2013, **5**, 8973–8976.
- 2 E. Gobin, K. Bagwell, J. Wagner, D. Mysona, S. Sandirasegarane, N. Smith, S. Bai, A. Sharma, R. Schleifer and J. X. She, A pan-cancer perspective of matrix metalloproteinases (MMP) gene expression profile and their diagnostic/prognostic potential, *BMC Cancer*, 2019, **19**, 1–10.