Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Supporting Information

Wetting transition in Nanochannels for Biomimetic Free-blocking On-Demand Drug Transport

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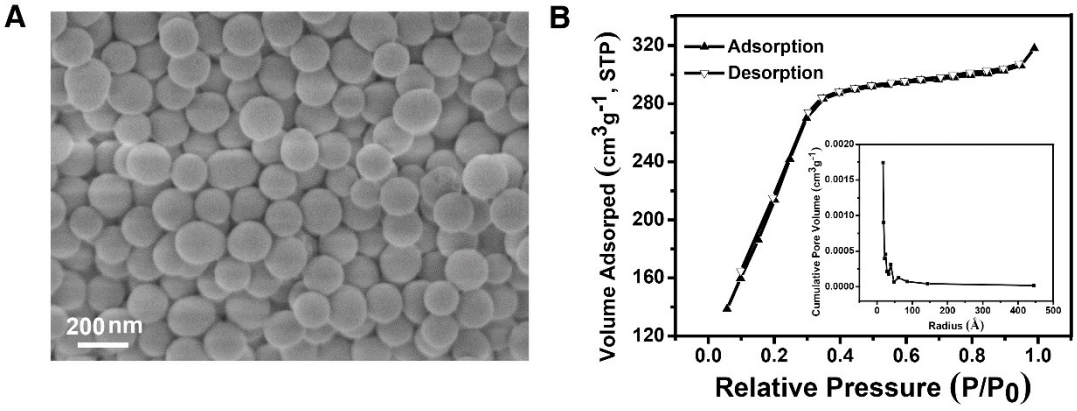

Figure S1. (A) SEM: The diameter of unmodified MSNs was around 153 nm. The scale bar was 1μm. (B) N_2 sorption analysis of unmodified MSNs (inset: pore size distribution) exhibited a type IV isotherm with a total surface area (Brunauer-Emmett-Teller, BET) of 1002.7 m^2g^{-1} and an average pore diameter of 4.2 nm.

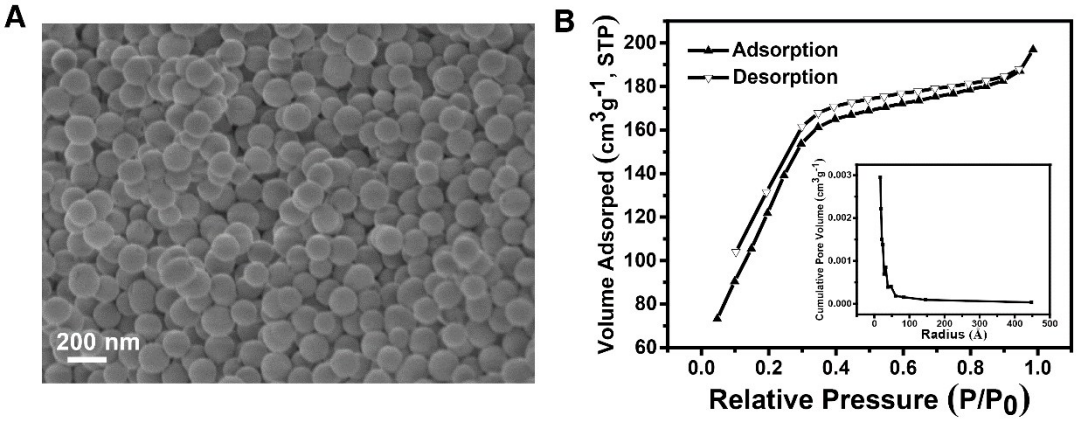

Figure S2. (A) SEM: The diameter of MSNs-PBA (1: 2) was around 165 nm. The scale bar was 300 nm. (B) N_2 sorption analysis of MSNs-PBA (1: 2) (inset: pore size distribution) exhibited a type IV isotherm with a total surface area (Brunauer-Emmett-Teller, BET) of 754.8 m^2g^{-1} and an average pore diameter of 3.5 nm.

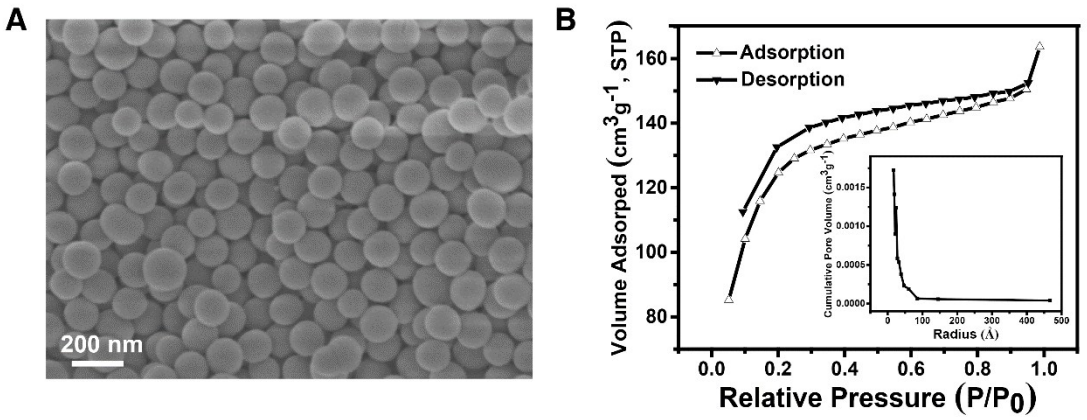

Figure S3. (A) SEM: The diameter of MSNs-PBA (1: 10) was around 150 nm. The scale bar was 300 nm. (B) N_2 sorption analysis of MSNs-PBA (1: 10) (inset: pore size distribution) exhibited a type IV isotherm with a total surface area (Brunauer-Emmett-Teller, BET) of 896. 2 m^2g^{-1} and an average pore diameter of 4.0 nm.

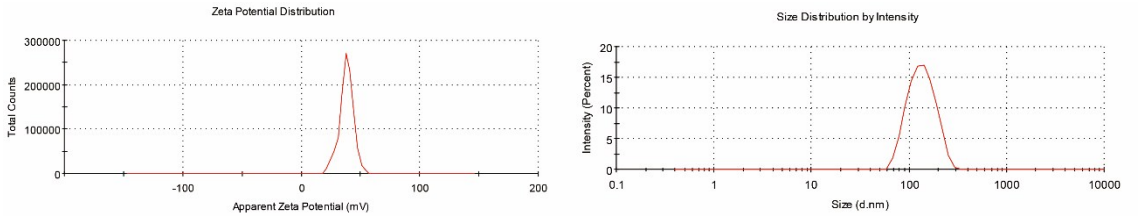

Figure S4. The characterized of MSNs-PBA by DLS. The Zeta potential of MSNs-PBA (1: 2) was 35.6 mV, the average size of MSNs-PBA (1: 2) was 173.5 nm.

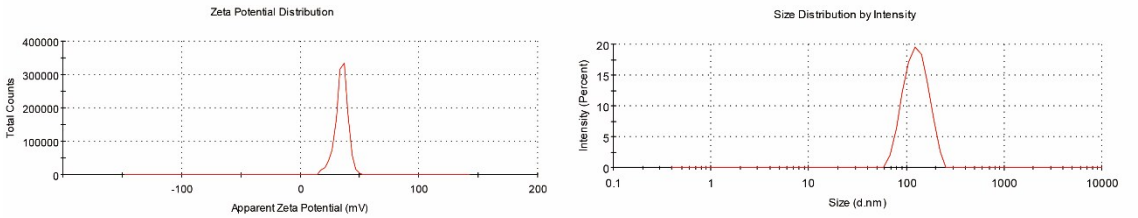

Figure S5. The characterized of MSNs-PBA by DLS. The Zeta potential of MSNs-PBA (1: 5) was 36.3 mV, the average size of MSNs-PBA (1: 5) was 199.2 nm.

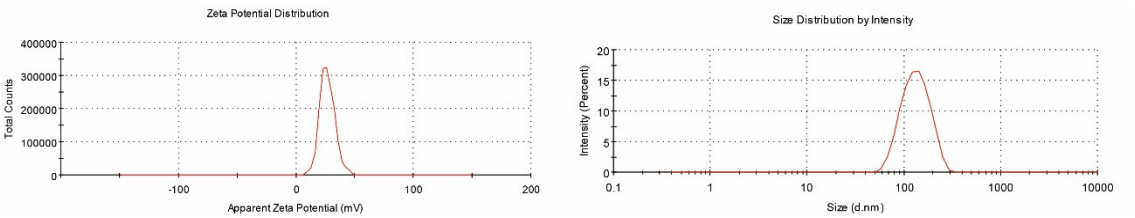

Figure S6. The characterized of MSNs-PBA by DLS. The Zeta potential of MSNs-PBA (1: 10) was 34.8 mV, the average size of MSNs-PBA (1: 10) was 183.4 nm.

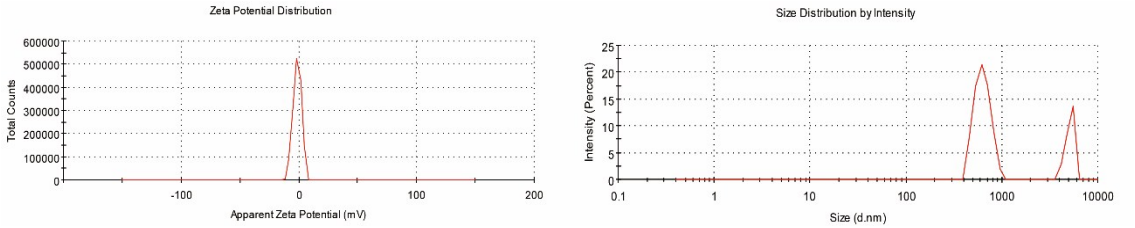

Figure S7. The characterized of MSNs-PBA with PBA group modified on the surface of silica nanoparticles [MSNs-PBA (1:10)-B] by DLS. The Zeta potential of MSNs-PBA (1: 10)-B was -3.07 mV, the average size of [MSNs-PBA (1: 10)-B] was 892.1 nm. This result proved that the dispersion of MSNs-PBA (1:10)-B was poor in aqueous solution.

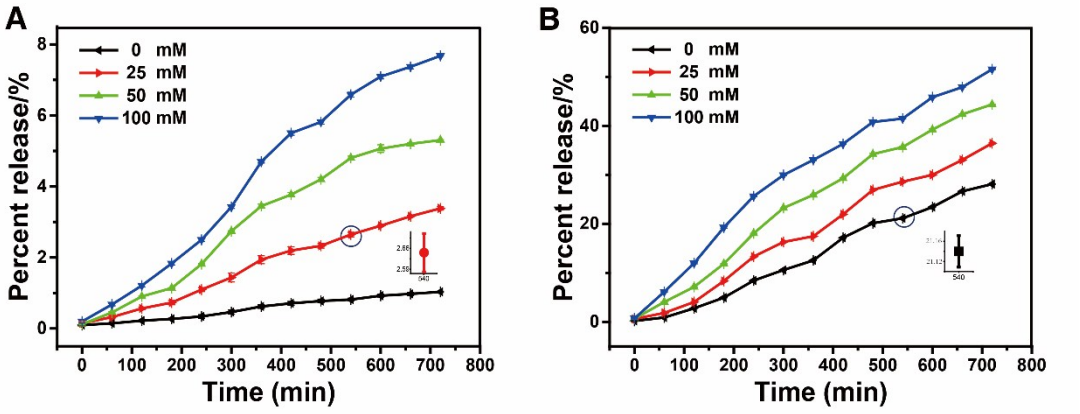

Figure S8. The release profile of Rh 6G from MSNs-PBA in different concentrations of glucose buffer solution versus time. The release rate gradually sped up as the glucose concentration was increased. (A) MSNs-PBA (1: 2), high PBA groups modification ratio caused the internal surface of nanopores was so highly hydrophobic that Rh 6G could hardly run out of the pores. (B) MSNs-

PBA (1: 10), low PBA groups modification ratio result in the nanopores without hydrophobic effect, so MSNs-PBA (1: 10) no longer has a blockage effect at pH 7.4 buffer solution.

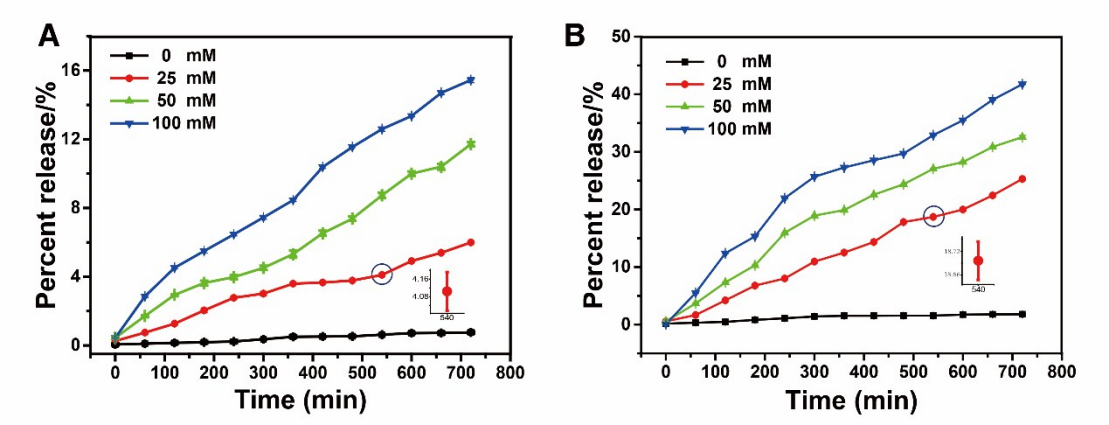

Figure S9. The release profile of Rh 6G from MSNs-PBA (1: 5) in different pH of glucose buffer solution versus time. (A) pH 6.5. (B) pH 8.0. The results shown that the functional molecules designed by us could improve the response of phenylboronic acid to glucose under physiological conditions.

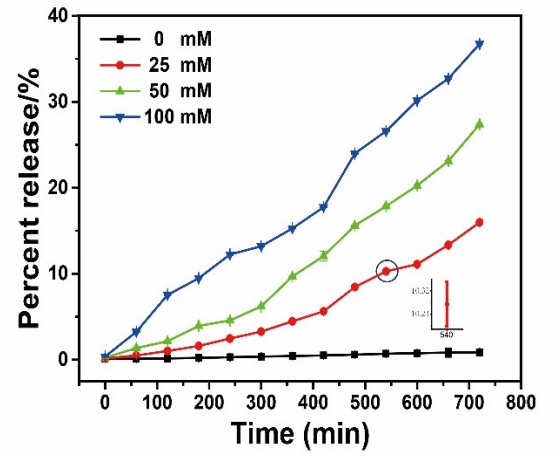

Figure S10. The release profile of DOX from MSNs-PBA (1: 5) in different concentrations of glucose buffer solution versus time. The release rate gradually sped up as the glucose concentration was increased.

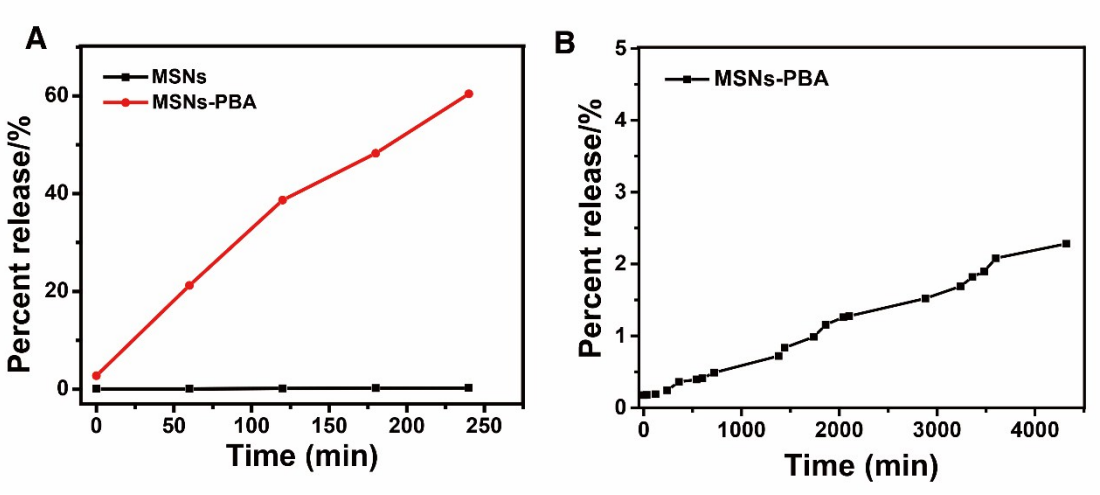

Figure S11. (A) The contrast of release profiles of Rh 6G-loaded MSNs-PBA (1: 5) and Rh 6G-loaded Unmodified MSNs at pH 7.4 buffer solution. (B) The release profile of DOX from MSNs-PBA (1: 5) in pH 7.4 buffer solution in 3 days (approximately 2.28%).

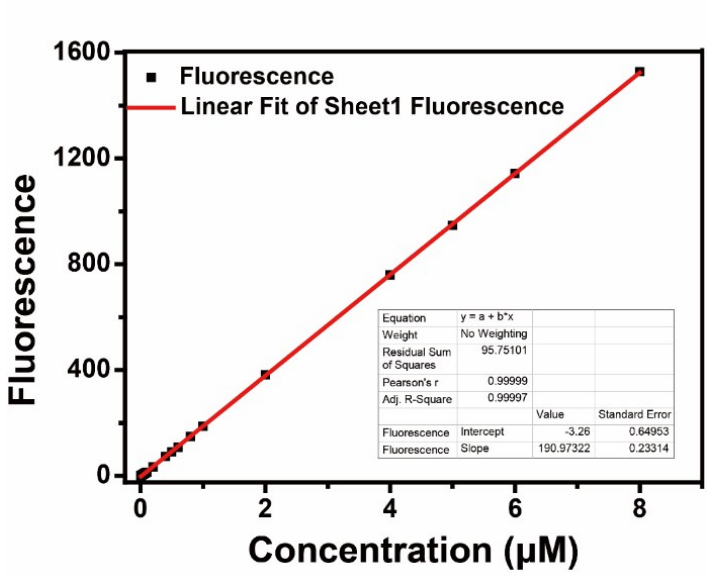

Figure S12. The calibration curves of Rh 6G solution was established by fluorescence spectroscopy with excitation wavelength and emission wavelength at 352 nm and 555 nm, respectively. The curve was used to determine the Rh 6G loading content in MSNs-PBA and monitoring the percentage of Rh 6G release from MSNs-PBA.

(The standard curve equation of Rh 6G solution : $F = 190.9732 \cdot c - 3.26$, $R2 = 0.9999$)

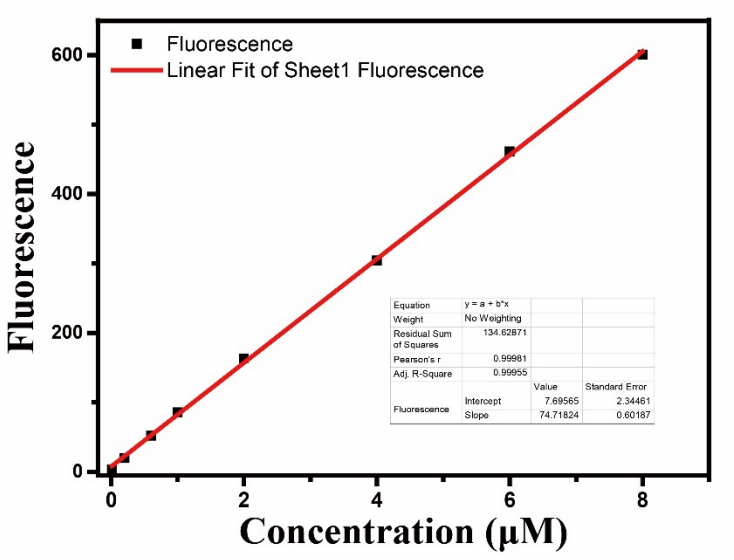

Figure S13. The calibration curves of DOX solution was established by fluorescence spectroscopy with excitation wavelength and emission wavelength at 480 nm and 550 nm, respectively. The curve was used to determine the DOX loading content in MSNs-PBA and monitoring the percentage of DOX release from MSNs-PBA.

(The standard curve equation of DOX solution : F = 74.71824 • c+7.69565, R2 = 0.9998)