

*Supplementary Material for*

**Stable Encapsulation and Responsive Release of Dyes via  
Noncovalent Molecular Lock Strategy: A Case Study of Rhodamine  
B Based Fluorescent Hydrogel Microspheres**

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**Table S1.** Parameters of the solution condition used in this study

| Parameters                                               | Value   |
|----------------------------------------------------------|---------|
| The flow rate of aqueous phase (mL/min)                  | 0.005   |
| The flow rate of oil phase (mL/min)                      | 0.15    |
| Wall contact angle (°)                                   | 90      |
| The viscosity of aqueous solution (Pa·s)                 | 0.00198 |
| The density of the aqueous solution (kg/m <sup>3</sup> ) | 1013    |
| The viscosity of oil solution (Pa·s)                     | 0.00045 |
| The density of the oil solution (kg/m <sup>3</sup> )     | 773     |
| Interfacial tension (N/m)                                | 0.0176  |

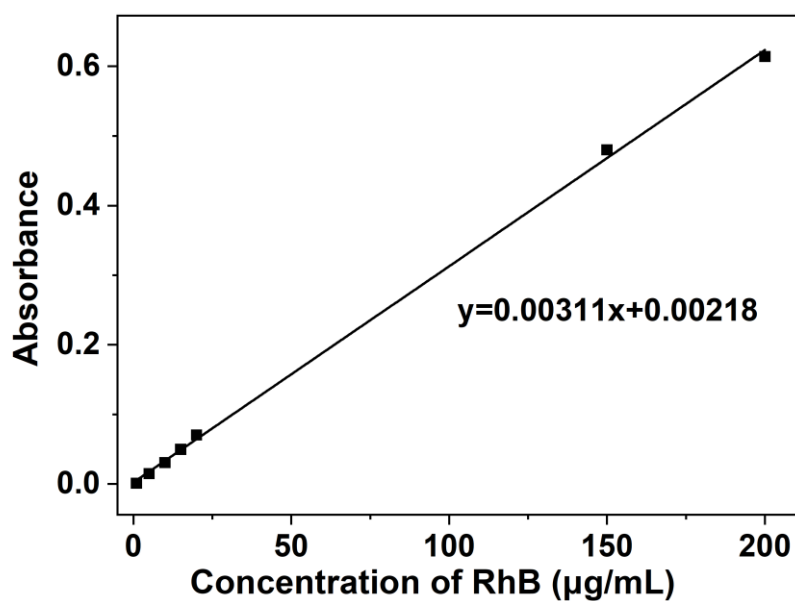


**Figure S1.** Standard Curve for RhB (Absorbance measured at 556 nm).

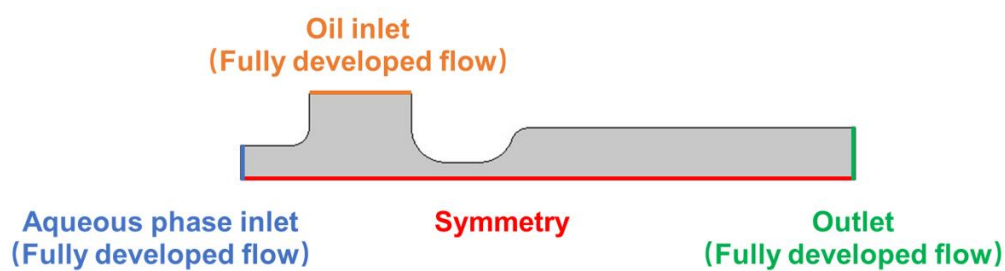


**Figure S2.** Boundary conditions in the droplet generation region.

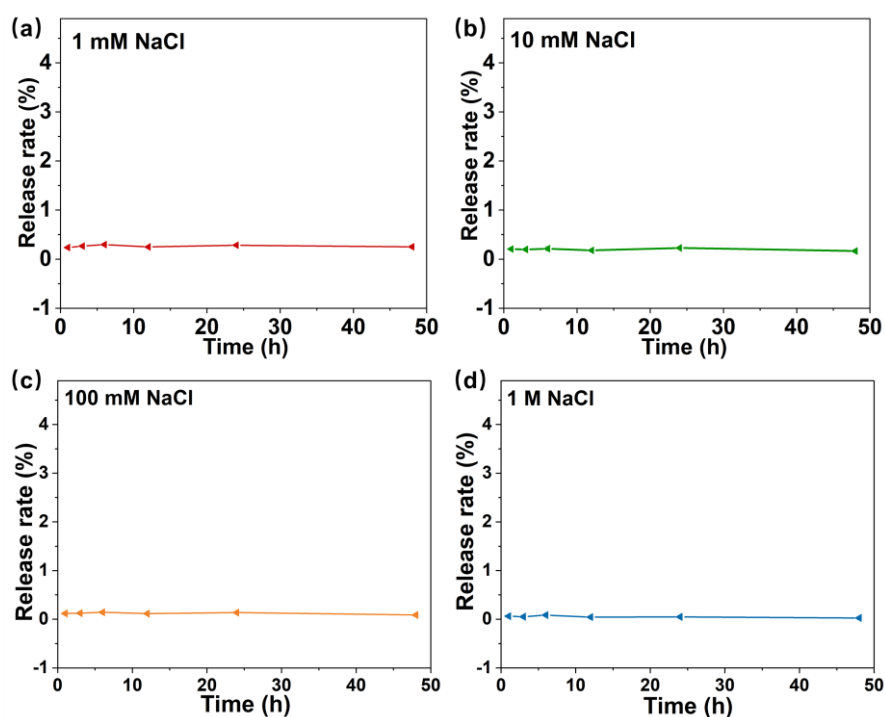


**Figure S3.** (a-d) Release rate profiles of RhB from PEGDA@RhB-TA microspheres in 1 mM, 10 mM, 100 mM, and 1 M NaCl solutions.

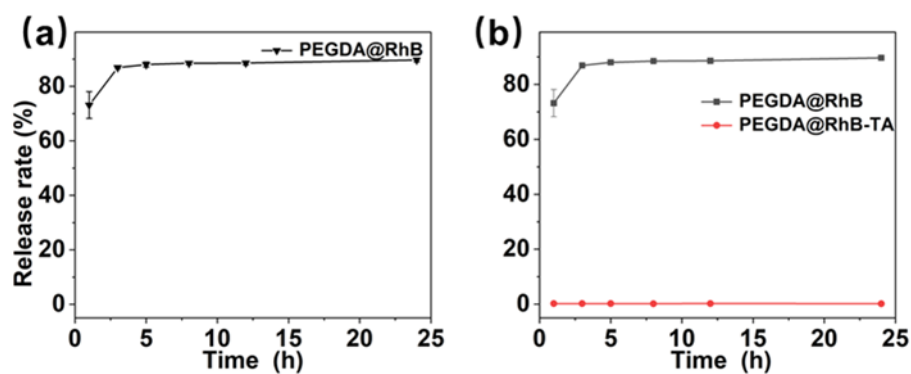


**Figure S4.** Release curve of RhB from PEGDA@RhB microspheres in 10 mM NaCl; Comparison of

release rates of PEGDA@RhB microspheres and PEGDA@RhB-TA microspheres of RhB from microspheres in 10 mM NaCl.

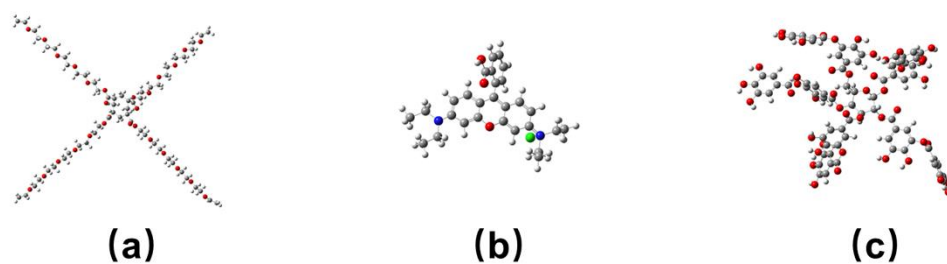


**Figure S5.** Small molecule structure diagram. (a) PEGDA, (b) RhB, (c) TA.

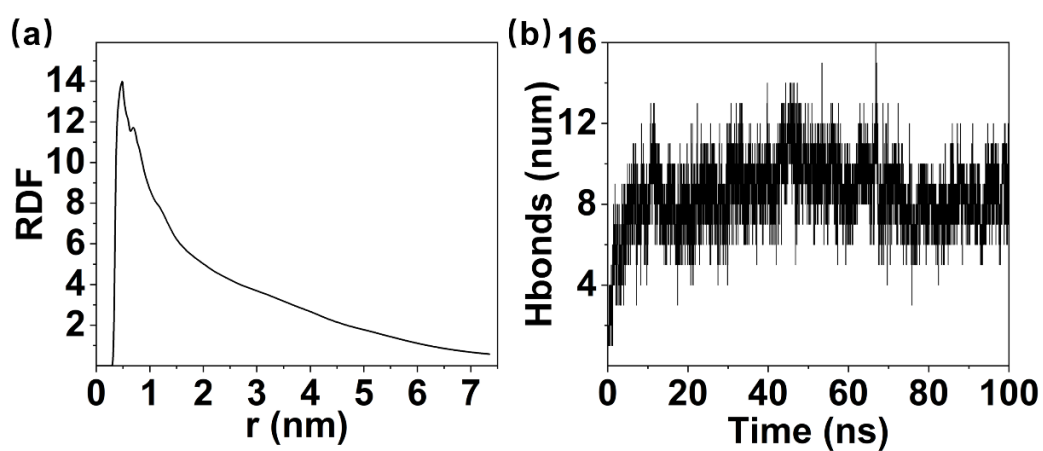


**Figure S6.** (a) RDF of RhB and TA nonpolar C atoms. (b) Hydrogen bonding analysis between RhB

and TA.

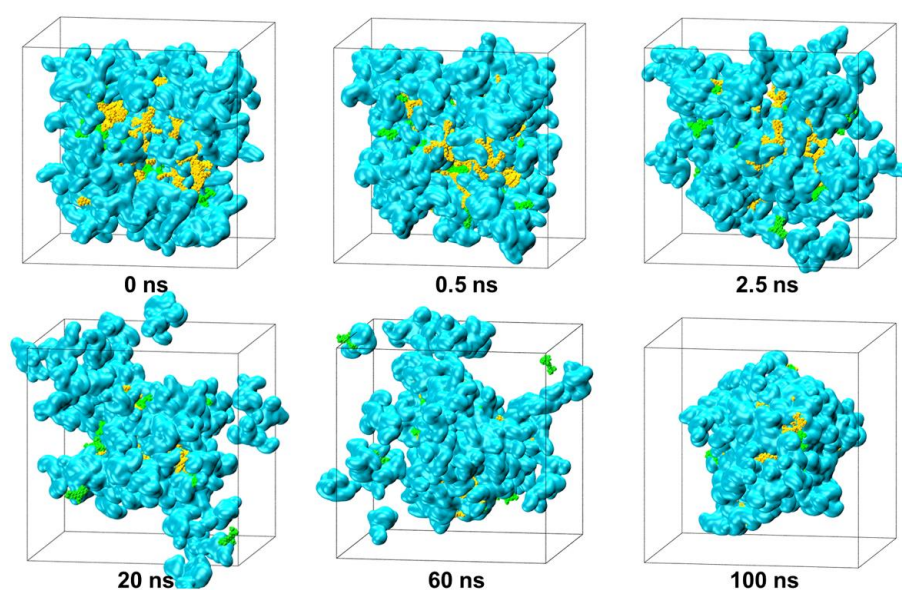


**Figure S7.** Simulated structural snapshots at 0, 0.5, 2.5, 10, 60, and 100 ns. Green represents RhB,

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yellow represents TA, and the polymer is represented as a solvated surface model in the figure.

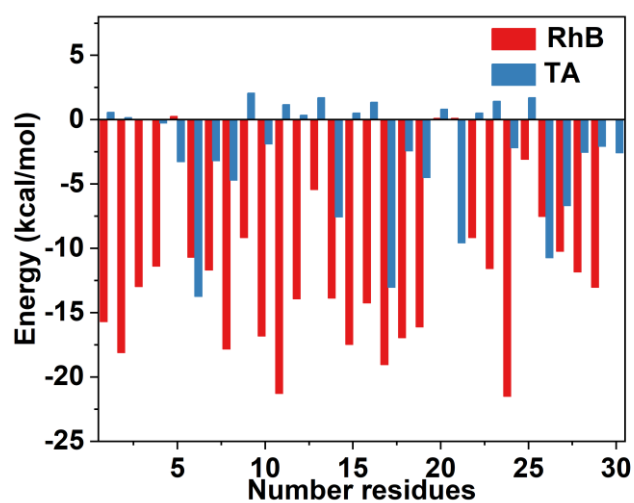


**Figure S8.** Energy contribution per molecule between RhB and TA.