Dynamic Supramolecular Templates as Tunable Platforms for Proximity Driven Chemical Transformations

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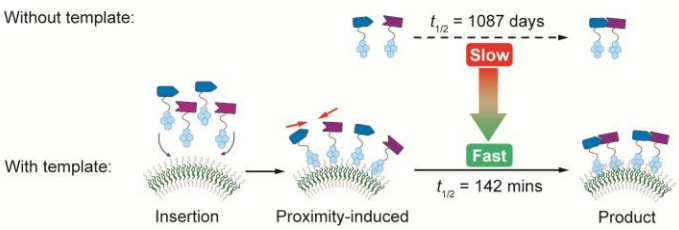
Introduction

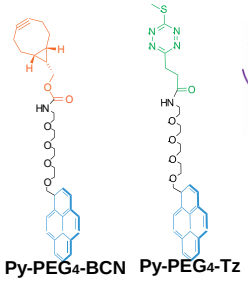
Our work:



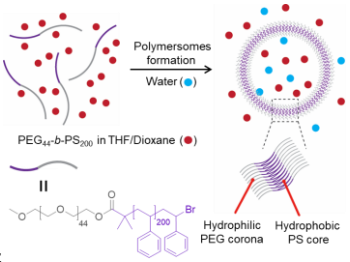
Controlling chemical reactions in dilute conditions is difficult due to slow rates and side reactions. Inspired by nature, we use a supramolecular strategy to bring reactants close together on polymersomes using a pyrene-based anchor. This boosts iEDDA click reaction rates over 10,500-fold in water and enables real-time fluorescence tracking. Our modular platform offers a simple, efficient approach for proximity-driven chemistry in water and biological systems.

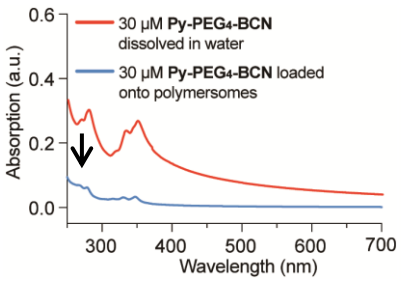
Loading of molecule 1 and 2 onto PEG corona

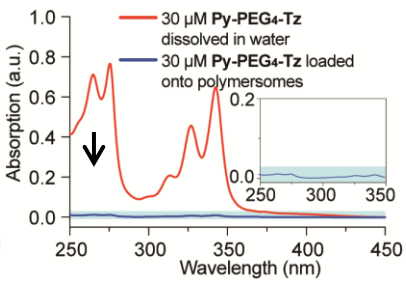
Anchor molecule



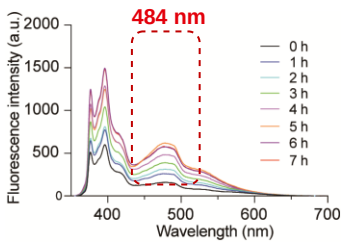
Supramolecular template

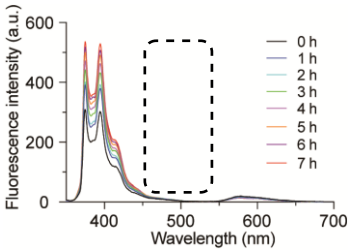


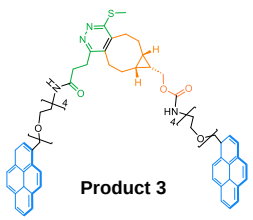


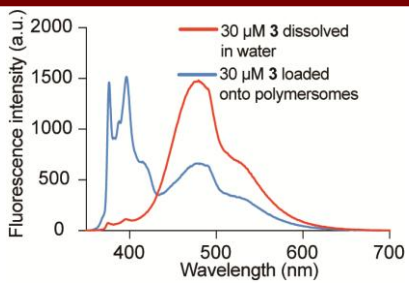


Conducting the reaction on Polymersomes

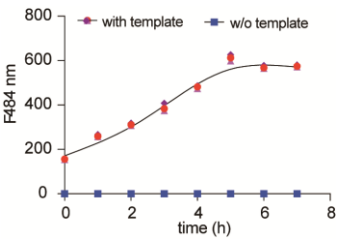




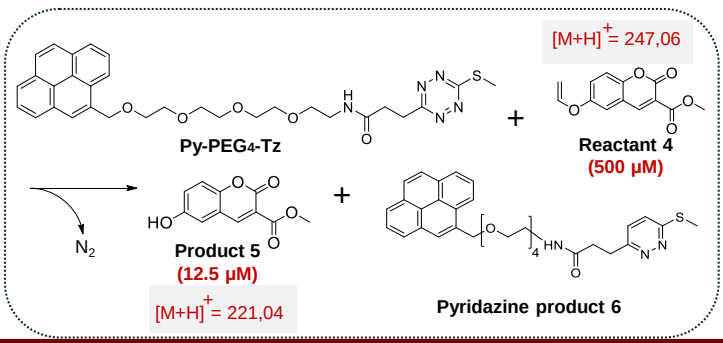


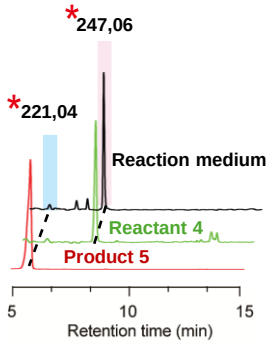


Investigation of Kinetic and Conversion



K_{obs} [s^{-1}] mean ± SD	$t_{1/2}$ [min] mean ± SD
(8.2 ± 0.125)*10^{-5}	142.1 ± 2.62





Conclusion

A universal pyrene-based supramolecular strategy boosts iEDDA reactions >10,000-fold on polymersomes, achieving 58% conversion under dilute conditions—offering a powerful platform for precision chemistry.

References

1. Zhang, S, et al. *Nat. Chem*. **15**, 240-247 (2023).
2. Stanton, B. Z, et al. *Science* **359**, eaao5902 (2018).
3. Wang, Q., Neumann, K., Wilson, D. *Submitted*.

Acknowledgements

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