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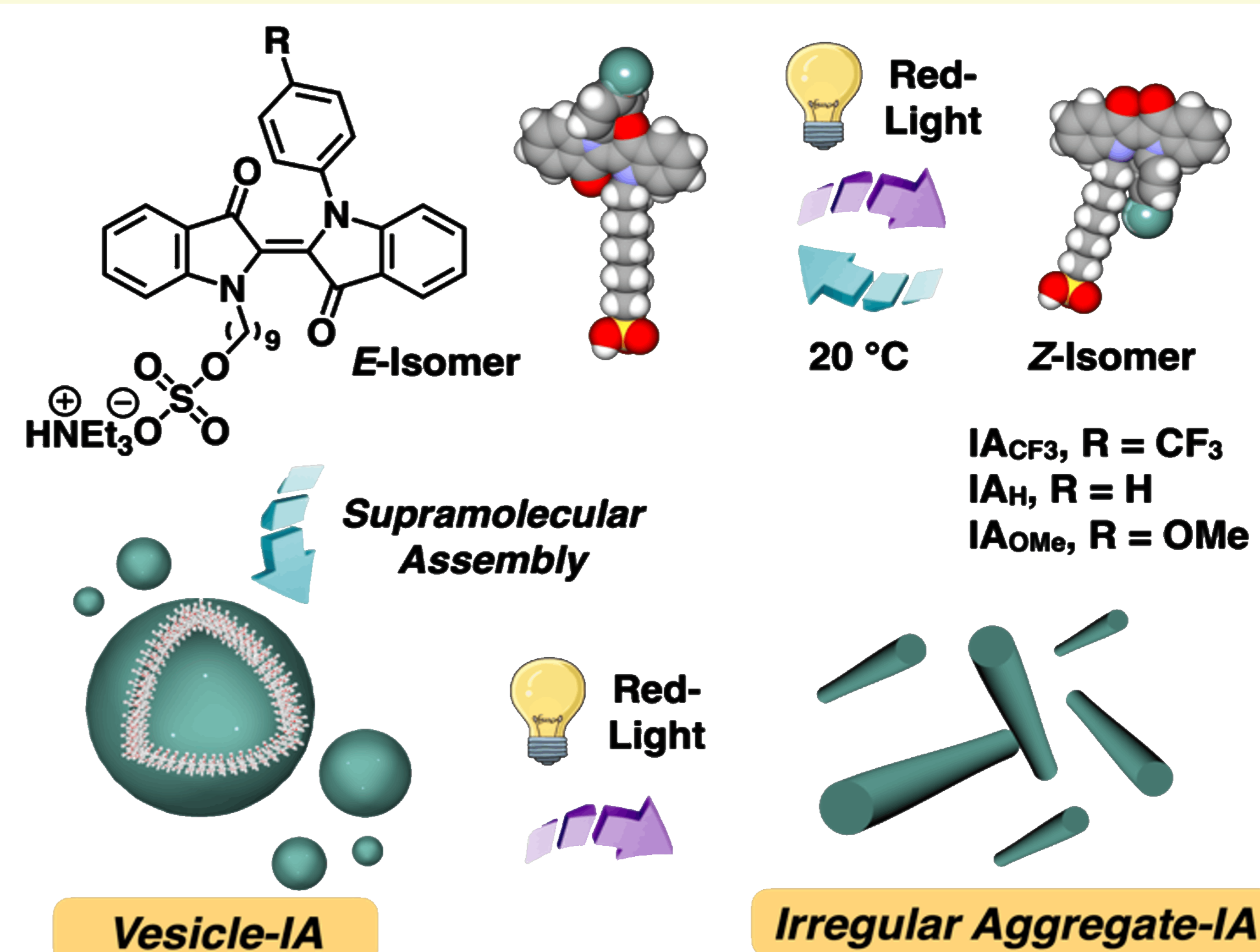
Red-Light Driven Photoisomerisation and Supramolecular Transformation of Indigo Amphiphiles in Aqueous Media

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Introduction

Various naturally existing supramolecular assemblies and polymers in aqueous media have been identified and served as a source of inspiration for designing synthetic supramolecular assembled systems. Red-light responsive N-alkyl and N-aryl indigos have been demonstrated with improved thermal half-life. To exert the full potential of photoswitchability and supramolecular assembly of indigo switch, herein, we report the design and synthesis of N,N'-alkyl-aryl-substituted indigo amphiphiles (IA). Through investigation of the photoisomerisation and supramolecular transformation processes, this approach could open up new strategies towards the development of red-light controlled biomedical soft functional materials.



Result and Discussion

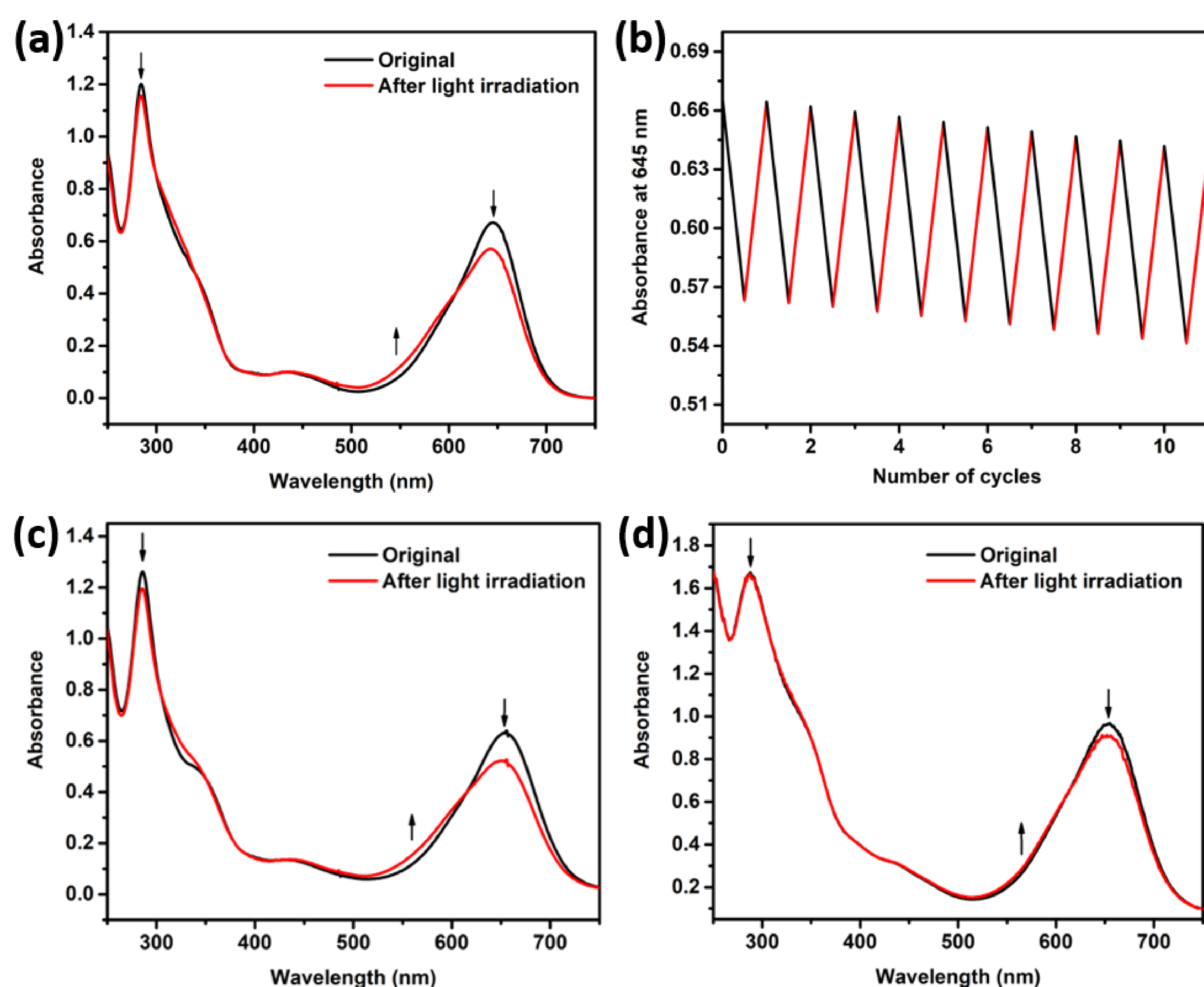


Fig. 1 UV-vis absorption spectra of IA_{CF_3} ($60 \mu M$), $E-IA_{CF_3}$ to $Z-IA_{CF_3}$ in (a) ACN, in the presence of (c) 25% of Tris-buffer (25 mM, pH 7.1) and (d) 75% in DOPC upon 660 nm red-light irradiation at 20 °C for 300 s. (b) The change in UV-vis absorption at 645 nm for IA_{CF_3} ($60 \mu M$) in ACN after ten red-light irradiation (black-line)/storage in dark (red-line) cycles.

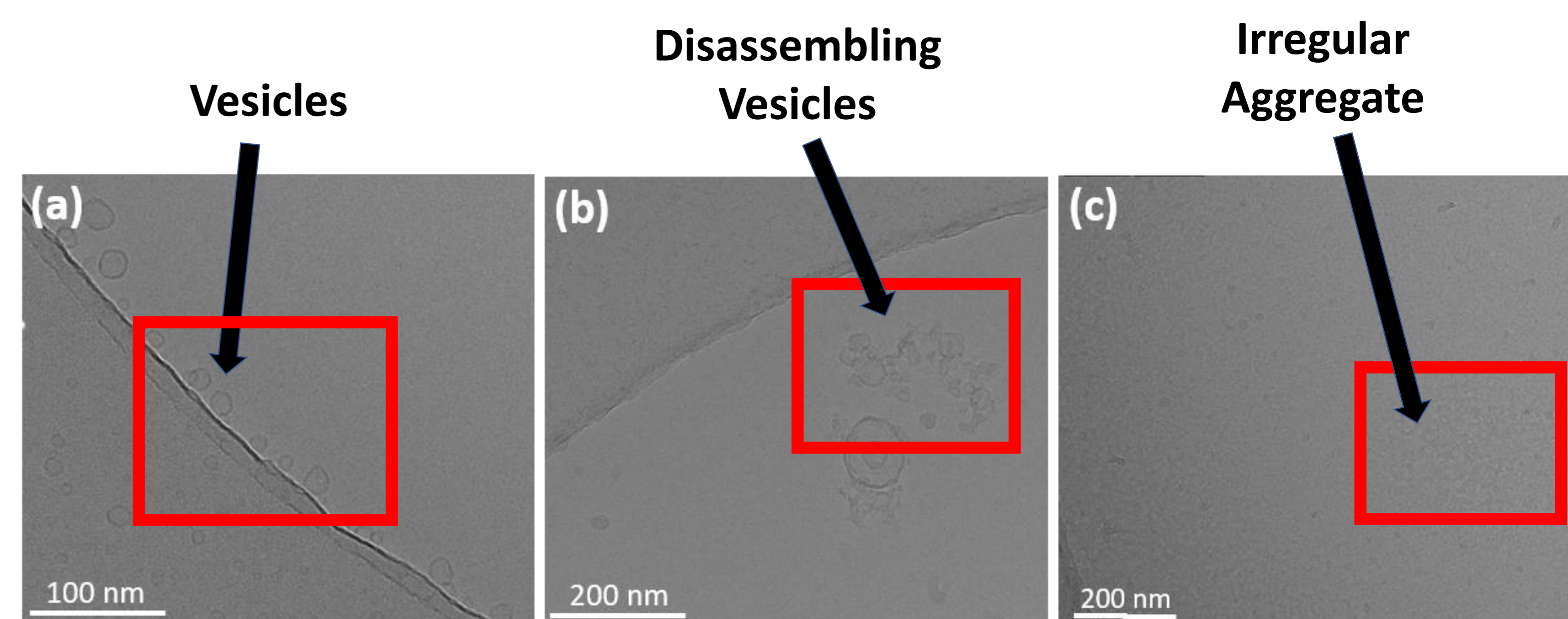


Fig. 2 Cryo-TEM images of thermal annealed Tris-buffer solution (25 mM, pH 7.1) of IA_{CF_3} (6.85 mM) (a) before irradiation, and after 660 nm red-light irradiation at 5 °C for (b) 60 min and (c) 120 min.

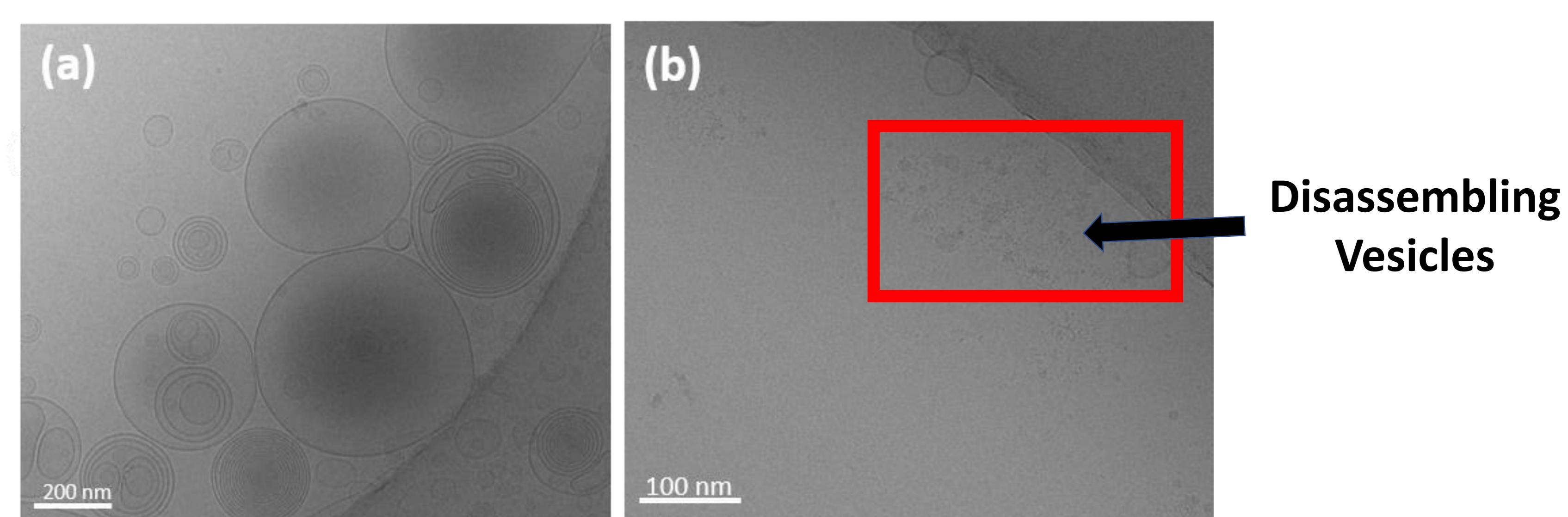


Fig. 3 Cryo-TEM images of aqueous solution of 25% of IA_{CF_3} in DOPC (b) before and (c) after 660 nm red-light at 5 °C for 100 min.

Conclusion

Red-light controlled IAs were designed to assemble into vesicles in aqueous media and driven supramolecular assembly transformations. This current approach demonstrates a new strategy for indigo photoswitching in aqueous media and developments of red-light controlled biomedical soft functional materials.

Acknowledgements

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