Isomeric Effect on Self-Assembly of Truxene Tri-amides

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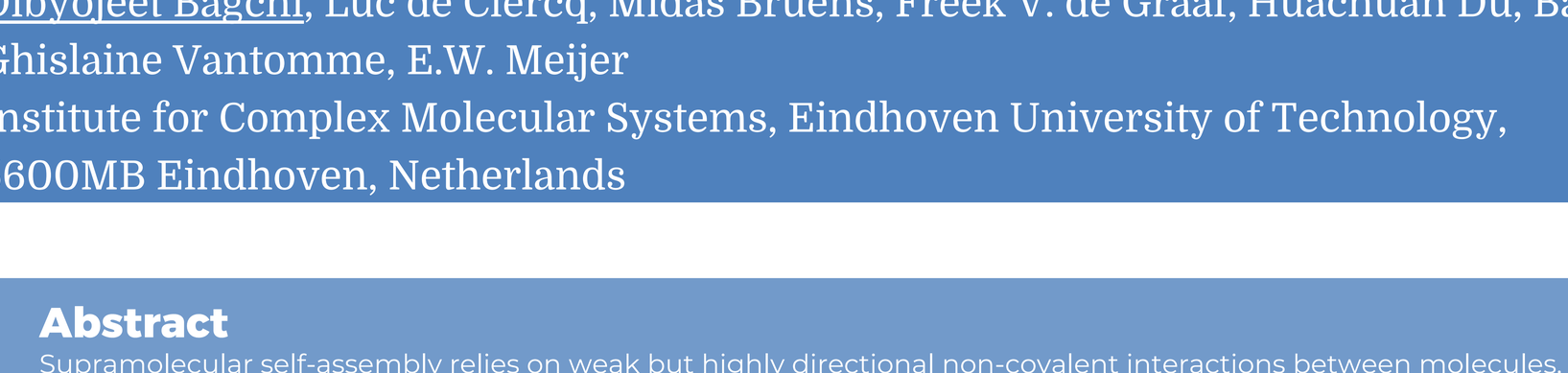
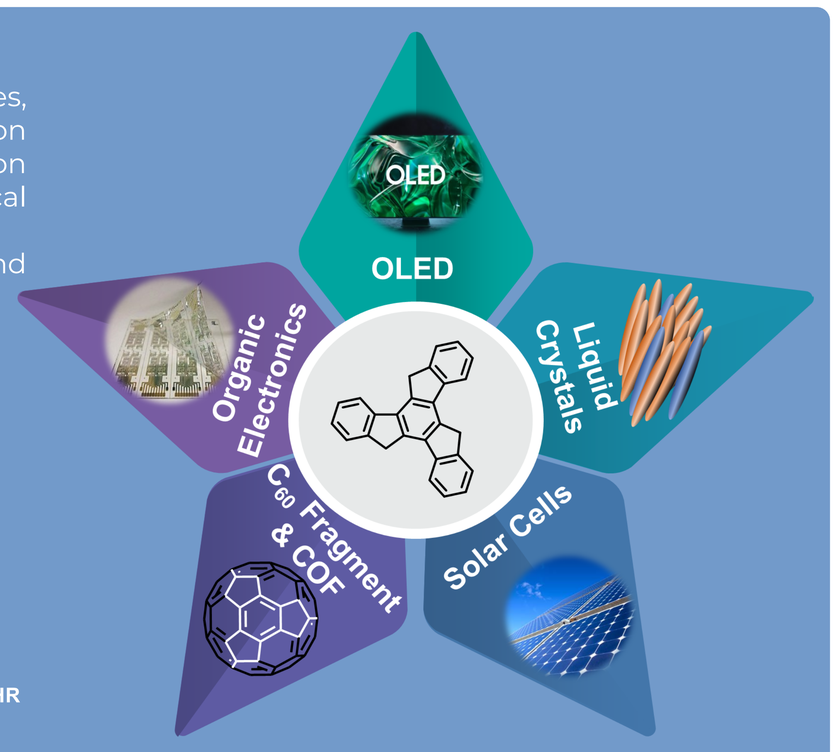
Abstract

Supramolecular self-assembly relies on weak but highly directional non-covalent interactions between molecules, making it highly dependent on the spatial arrangement of atoms[1]. Within isomers a slight difference in position or spatial orientation of a functional group can significantly impact molecular self-assembly[2]. We focus on truxene, an interesting C_3-symmetric planar polycyclic aromatic hydrocarbon known for its exceptional chemical and optical properties as well as its ease of synthetic modification[3].

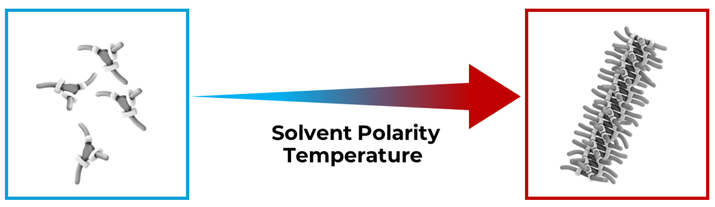
Herein we report a facile synthesis of chiral & achiral 2,7,12 and 3,8,13 substituted truxene tri amides and differences in their self-assembly behavior probed using spectroscopic and microscopic techniques.

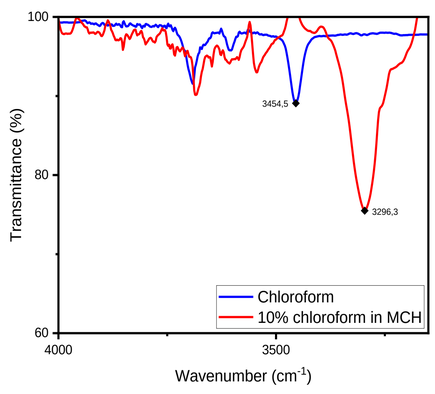


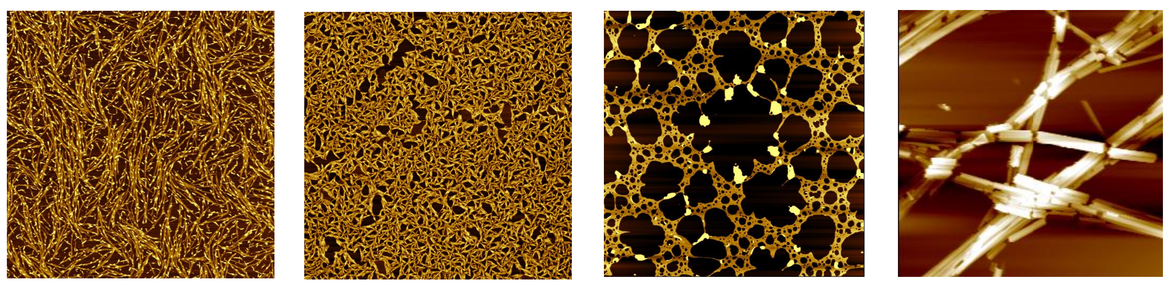


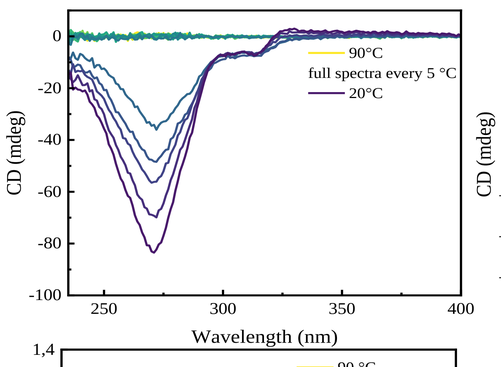
Self Assembly Studies on 2,7,12 & 3,8,13 Isomers of Truxene

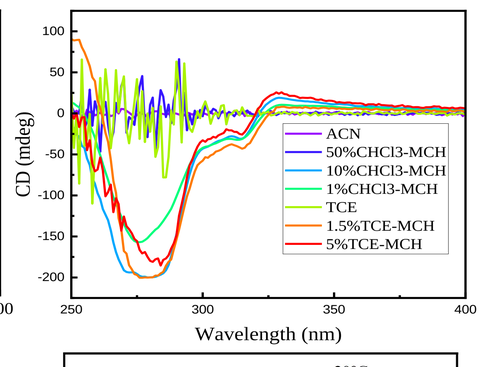
Probing self-assembly via –
- Spectroscopy (UV-Vis, C.D, P.L, FT-IR)
- Microscopy (AFM, SEM)

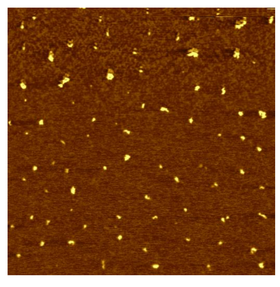




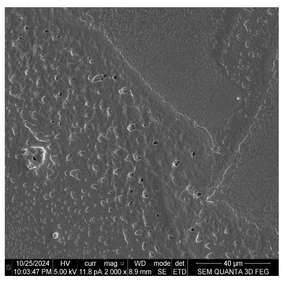


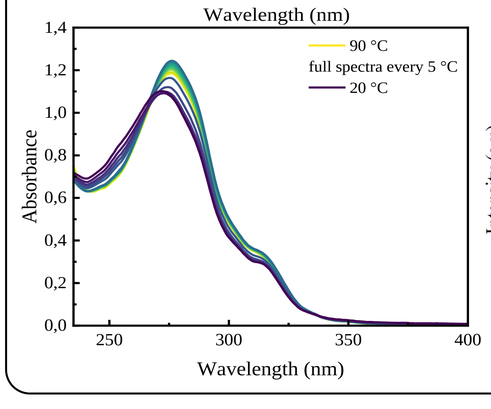


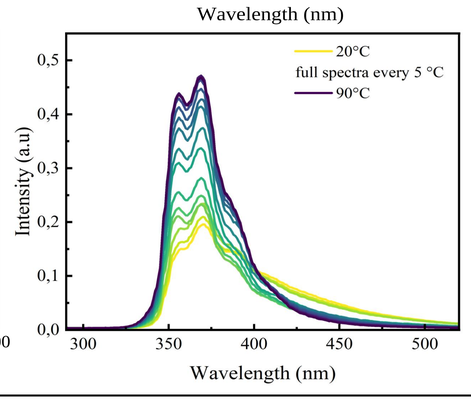




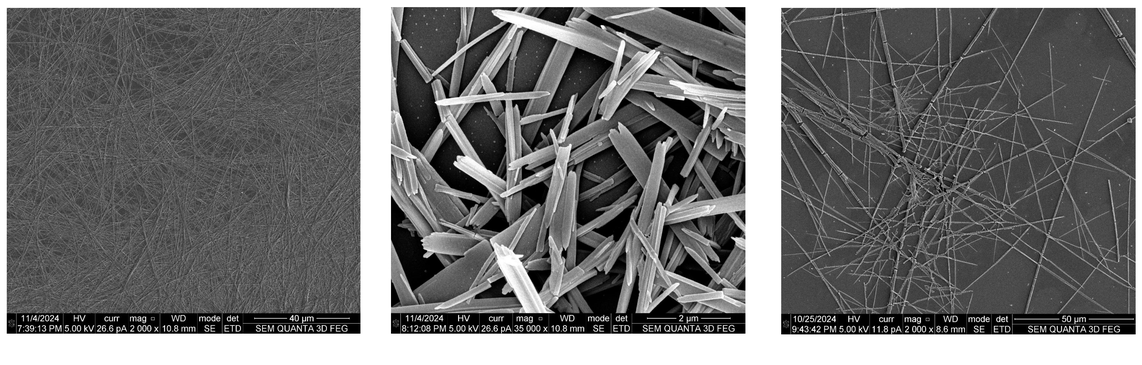
No Assembly in Polar Solvents







Difference in Assembly Morphology



Conclusion & Outlook

In conclusion we have –
- Synthesized both chiral and achiral analogue of 2,7,12 & 3,8,13 isomer of truxene triamide
- Isomers differs in their physical (Solubility, Melting Point), optical properties (λ_{max}, emission) & propensity for self assembly
- Demonstrated that different isomer show different self assembled morphology

In future we would like to compare the mechanism and thermodynamics of self-assembly between 2,7,12 & 3,8,13 isomer, we would then further like to see difference in spin filtering properties of different isomers.

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