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Graphene edge chemistry and membrane formation with supramolecular approaches using Pt(II)-terpyridine molecular tweezers

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Propositions

Accompanying the thesis

Graphene edge chemistry and membrane formation with supramolecular approaches using Pt(II)-terpyridine molecular tweezers

1. The solvent is a critical component governing the binding between Pt(II)-terpyridine molecular tweezers and polycyclic aromatic hydrocarbons (PAHs), yet its role is often overlooked. (*Chapter 2*)
2. Understanding the role of different structural components in Pt(II)-terpyridine molecular tweezers and PAHs is key in designing supramolecular systems with high affinity and selectivity. (*Chapter 3 and 4*)
3. Scalable fabrication of graphene nanopores using controlled breakdown (CBD) can only be realized through *de novo* engineering of the protocol and not by adapting the methods used to create pores in silicon nitride membranes. (*Chapter 5*)
4. Integrating computational screening and experimental efforts overcomes traditional limitations of the Langmuir-Blodgett technique, enabling the fabrication of non-covalent 2D materials from non-amphiphilic precursors. (*Chapter 6*)
5. Promising results and values are meaningless without addressing reproducibility and experimental errors. (*Thordarson, P. Chem. Soc. Rev. 2011, 40 (3), 1305–1323*)
6. Behind every free energy relationship, an even more complex model may be hidden. (*Würthner, F. J. Org. Chem. 2022, 87 (3), 1602–1615*)
7. For every system that demonstrates enhanced affinity or performance, numerous candidates are discarded due to synthetic and physical complications.
8. To achieve viable solid-state nanopore sequencing technologies, one should first understand the structural and the chemical characteristics of the nanopore.
9. Scientific breakthroughs require determined scientists who can commit to incremental progress.
10. In science, time spent away from the bench is as critical as time spent at it, both professionally and personally.
11. Curiosity is inexhaustible; therefore, it is our responsibility as scientists to consciously direct our intellectual efforts.

Andy Jiao
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