Binding of flat PAHs and graphene with molecular tweezers

Andy Jiao
D.V. Filippov, S.A. Bonnet, and G. F. Schneider
Leiden Institute of Chemistry, Supramolecular and Biomaterials Chemistry, Leiden University, Einsteinweg 55, 2333CC Leiden, The Netherlands
a.jiao@lic.leidenuniv.nl

Graphene is atomically thin and conductive, which makes it an interesting material for molecular sensing such as DNA sequencing.[1] However, applicability of graphene remains limited due to the difficulties in functionalizing the graphene edges, as many impurities and defects can be introduced during sculpting and electrografting of graphene. The introduction of impurities and defects can be avoided by functionalizing the graphene edges using non-invasive supramolecular forces. To this end, defect-free graphene functionalization is envisioned to be possible using molecular tweezers as graphene edge clamps. One such molecular tweezer has been synthesized, which is shown to bind polycyclic aromatic hydrocarbons (PAHs) such as pyrene and coronene with binding constants in the order of 10^4 M^{-1}.[2] The next challenge is how to determine the exact binding mode of the molecular tweezer with larger PAHs and graphene.

References

[1] Goto, Yusuke, et al, 65.1 (2020): 69-77.
[2] Tanaka, Yuya, Keith Man-Chung Wong, and Vivian Wing-Wah Yam, Chemistry–A European Journal, 19.1 (2013): 390-399