

Signature of the Dirac cone in the properties of linear oligoacenes

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Linear oligoacenes (linearly fused benzene rings) are ideal examples of quantum wires and the simplest realisation of the so-called nanographene. We show that, contrary to held beliefs, the excitation gaps of oligoacenes can display oscillations with a period of 11 benzene-type rings. By means of ab initio calculations we inspect the polyacene electronic band-structure and show that the incommensurate oscillations are caused by the presence of an accidental degeneracy at the Fermi level, reminiscent of the Dirac cone of graphene [1]. Considering prospective technological applications, we predict this property to survive under the screening environment of a metallic surface. Our findings have a potential for advancement in the fields of organic electronics and materials for energy conversion.

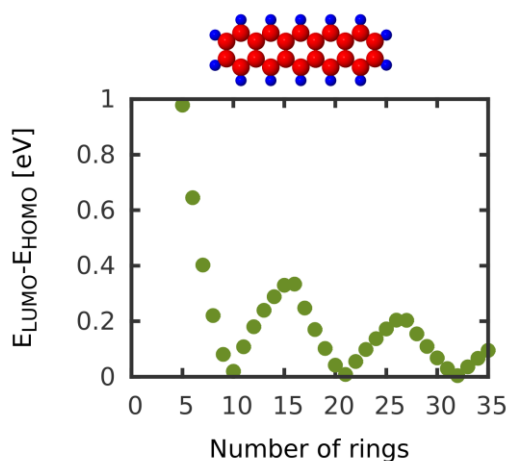


Figure : The molecule of pentacene (5 benzene-type rings) and the oscillation of energy band gap with respect to the molecular length.

[1] R. Korytár, D. Xenioti, P. Schmitteckert, M. Alouani, F. Evers, *Signature of the Dirac cone in the properties of linear oligoacenes*, F. Nat. Comm., **5**, 5000 (2014)

