Challenging Edges: Bottom-up Synthesis of Nanographenes

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Bottom-up synthesized, atomically precise graphene nanostructures such as nanographenes or graphene nanoribbons (GNRs) represent an imperative category of organic materials because of their exceptional intrinsic optical, electronic and magnetic properties.[1] At the molecular dimension below 5 nm, the edge periphery predominately influences their electronic structure. Nanostructures with tailor-made width on the atomic level, for instance stable armchair graphene nanoribbons (AGNRs), have been explored for digital operation and field effect transistors.[2] Also, internal or peripheral heteroatom doped nanographenes have been investigated for the fabrication of heterojunctions.[3,4] In contrast to fully-benzenoid topologies, corresponding frameworks with rich zigzag edges posess localized edge states and exclusive magnetic features allowing excess to organospintronic nanodivices.[5] However, the synthesis and molecule handling of such reactive edge topologies remains a great challenge and only few examples have been demonstrated by advanced on-surface protocols.[6,7] In this work we focus on nanographene skeletons containing expanded zigzag edge structures and present novel synthetic strategies. Additionally, we are examine solid-state reaction approaches towards obtaining a series of finite nanographene segments with diverse shape and edge structure.[8]

References

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Figure

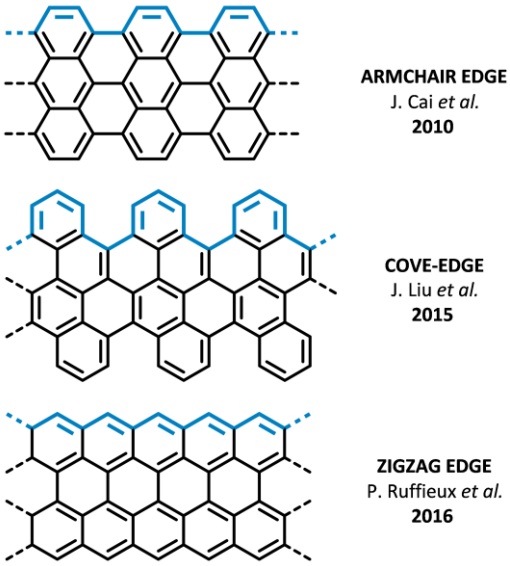

Figure 1: Graphene nanoribbon edges.