Multialkyne annulations: Synthesis of achiral and chiral nanographenes

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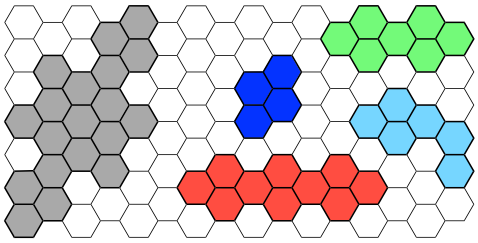
The development of new methodologies to afford large polycondensed aromatics, often referred to as nanographenes (NGs), is in high demand. This is because NGs often possess interesting physical properties that can be harnessed in a variety of electronic and optical applications. Previously, the toolbox for NG synthesis has been limited, along with the scope of compounds that could be made. This is in part due to the harsh oxidative methods often used to fuse benzene or other aromatic components together to arrive at larger conjugated π-systems. This chemistry often limits the functionality that can be incorporated into the NG precursors and thus, often leading to insoluble materials that are difficult to characterize and utilize in various applications. Our group has sought to alleviate this problem but developing new methods that rely on high-energy alkyne-containing starting materials that can lead to highly soluble NG products in a relatively mild and non-oxidative way. For example, we have recently developed a mild and efficient acid-catalyzed benzannulation of alkyne-containing synthetic precursors to afford soluble NGs – including pyrenes, peropyrenes, and teropyrenes – as well as graphene nanoribbons.[1-3] Using this methodology, we have also been able to expand the scope of NGs that can be accessed to include very large compounds that are contorted, and even chiral.[4,5] Some of these new structures and their interesting physical properties will be presented.



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