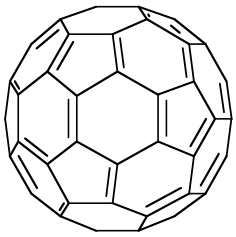
Chemistry of buckybowls: bowl-shaped π -aromatic compound

Hidehiro Sakurai

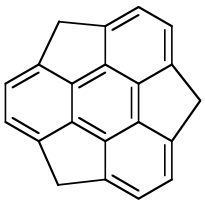
Institute for Molecular Science, Myodaiji, Okazaki 444-8787, Japan

e-mail address: hsakurai@ims.ac.jp

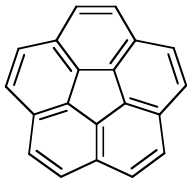
Bowl-shaped π-conjugated compounds including partial structures of the fullerenes, which are called "buckybowls", are of importance not only as model compounds of fullerenes but also as their own chemical and physical properties. For example, in solution they show the characteristic dynamic behavior such as bowl-to-bowl inversion. On the other hand, they sometimes favor stacking structure in a concave-convex fashion in the solid state, giving excellent electron conductivity [1]. Furthermore, some buckybowls are conceivable to possess the bowl-chirality if the racemization process, as equal as bowl-to-bowl inversion, is slow enough to be isolated. Control of the chirality of such non-planer π-conjugated carbon materials is one of the most challenging issues, leading not only to the chirality control of carbon nanotubes but also to the development of novel chiral organic materials. However, very few buckybowls has been achieved for preparation mainly due to their strained structure, and no report on the preparation of chiralbowls has appeared until our first success [2]. In addition, most of thus-reported procedures are performed under severe reaction conditions, limiting the sort of the introducible atoms/functional groups. We have proposed a new synthetic strategy for buckybowls from small carbon resources with sp^3 carbons through stepwise organic synthesis [3]. In this seminar I will discuss how to make out the strategy in details.



Fullerene
C_{60}



Sumanene(1)
$C_{21}H_{12}$



Corannulene
$C_{20}H_{10}$

[1]. H. Sakurai, T. Daiko, H. Sakane, T. Amaya, T. Hirao, J. Am. Chem. Soc. **127**, 11580 (2005).

[2]. S. Higashibayashi, H. Sakurai, J. Am. Chem. Soc. **130**, 8592 (2008).

[3]. H. Sakurai, T. Daiko, T. Hirao, Science **301**, 1878 (2003).