二段階付加環化反応による分子ナノカーボンの誘導化

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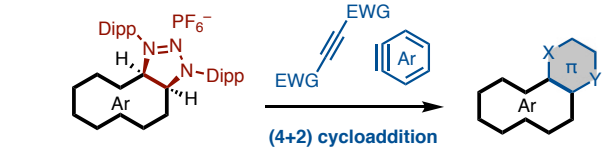
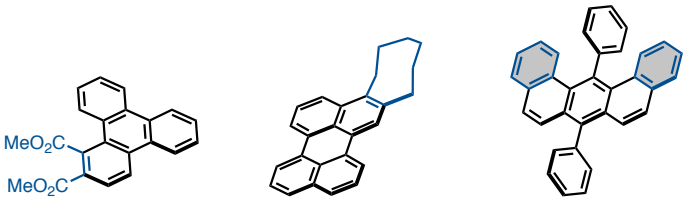
Derivatization of molecular nanocarbons by two-step cycloaddition reaction ([1]*Graduate School of Science, Nagoya University,* [2]*Ewha Womans University,* [3]*RIKEN,* [4]*Institute of Transformative Bio-Molecules (WPI-ITbM), Nagoya University*) ○Rikuo Tanase,[1] Besteiro Javier,[1] Sajan Pradhan,[2] Jean Bouffard[2], Kazuma Amaike,[3] Kenichiro Itami[3,4]

Molecular nanocarbons are a group of compounds with potential applications not only in materials chemistry but also in biology. However, challenges remain in the derivatization processes for these applications including multi-step synthesis and inherent difficulties in their chemical transformations. To address these issues, we focused on the [3+2] cycloaddition reaction between diazaanoniaallene (DAAA) cations and benzene derivatives, followed by the [4+2] cycloaddition reaction with alkynes or benzynes, as reported by the Bouffard group in 2023.[1] We assumed that these reactions could be applied to the molecular nanocarbons to enable efficient derivatizations. We have demonstrated that [3+2] cycloaddition reaction proceeds for various molecular nanocarbons.[2] In this presentation, we report the subsequent [4+2] cycloaddition reaction with electron-deficient alkynes and aryne.
Keywords : Molecular nanocarbon; [3+2]cycloaddition; [4+2]cycloaddition; Dearomatization, Click chemistry

分子ナノカーボンは材料化学分野だけでなく、最近では生物分野への応用が期待されている化合物群である。しかし応用を指向した誘導化には合成が多段階になることや合成の困難さが依然として課題である。そこで 2023 年に Bouffard グループらが報告した diazaanoniaallene (DAAA)カチオンとベンゼン誘導体との[3+2]付加環化反応と続くアルキンやベンザインとの[4+2]付加環化反応を分子ナノカーボンに適用することで、短段階で誘導化が可能になると考えた[1]。これまでに種々の分子ナノカーボンに対する[3+2]付加環化反応が進行することを報告しており[2]、本発表では二段階目の電子不足アルキンやアラインとの[4+2]付加環化反応について報告する。





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