

# CBC Virtual Seminar Series

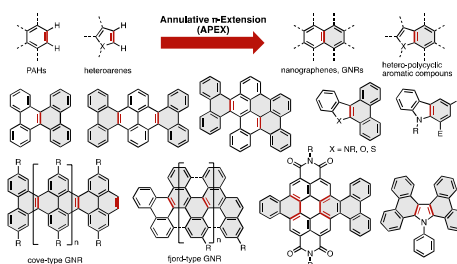


**Associate Professor Hideto Ito**  
**Nagoya University, Japan**

## Annulative $\pi$ -Extension Chemistry (APEX): Precise and Rapid Synthesis of Nanographenes and Graphene Nanoribbons

Annulative  $\pi$ -EXTension (APEX) has emerged as a powerful and efficient synthetic method for the construction of polycyclic aromatic hydrocarbons (PAHs), nanographenes, and heteroatom-containing polycyclic aromatic compounds.<sup>1</sup> In contrast to classical multi-step syntheses requiring substrate prefunctionalization, APEX reactions minimize the number of preparative steps by direct C–H functionalization of small aromatic templates.

Since we defined 'APEX' as a novel synthetic concept in 2015,<sup>2a</sup> we have developed a series of palladium-catalyzed APEX reactions using various  $\pi$ -extending agents such as dibenzosilole<sup>2a,b</sup> and diiodobiaryls,<sup>2c,d</sup> and enabled one-step PAH-to-nanographene  $\pi$ -extensions in a fashion of direct C–H functionalization. In addition, we succeeded to develop sequential APEX reactions, *i.e.* APEX polymerization<sup>3</sup> for the precise synthesis of graphene nanoribbons with controlling over edge-structure, width and even length, which has been otherwise difficult to synthesize by conventional methods.<sup>3a</sup> In the presentation, our recent reports on APEX chemistry for precise synthesis of nanographenes and graphene nanoribbons will be presented.<sup>2,3</sup>



### References

- (1). (a) Ito, H.; Ozaki, K.; Itami, K. *Angew. Chem., Int. Ed.* **2017**, *56*, 11144. (b) Ito, H.; Segawa, Y.; Murakami, K.; Itami, K. *J. Am. Chem. Soc.* **2019**, *141*, 3. (2). (a) Ozaki, K.; Kawasumi, K.; Shibata, M.; Ito, H.; Itami, K. *Nature Commun.* **2015**, *6*, 6251. (b) Shibata, M.; Ito, H.; Itami, K. *J. Am. Chem. Soc.* **2018**, *140*, 2196. (c) Matsuoka, W.; Ito, H.; Itami, K. *Angew. Chem. Int. Ed.* **2017**, *56*, 12224. (d) Kitano, H.; Matsuoka, W.; Ito, H.; Itami, K. *Chem. Sci.* **2018**, *9*, 7556. (e) Kawahara, K. P.; Matsuoka, W.; Ito, H.; Itami, K. *Angew. Chem., Int. Ed.* **2020**, *59*, 6383. (3). (a) Yano, Y.; Mitoma, N.; Matsushima, K.; Wang, F.; Matsui, K.; Takakura, A.; Miyauchi, Y.; Ito, H.; Itami, K. *Nature* **2019**, *571*, 387. (b) Yano, Y.; Wang, F.; Mitoma, N.; Miyauchi, Y.; Ito, H.; Itami, K. *J. Am. Chem. Soc.* **2020**, *142*, 1686. (3) Mitoma, N.; Yano, Y.; Miyauchi, Y.; Ito, H.; Itami, *ACS Appl. Nano Mater.* **2019**, *2*, 4825.

### Biography

Hideto Ito was born in Hakodate, Hokkaido, Japan (1983). He learned organometallic chemistry and organic chemistry in Hokkaido University under the supervision of Prof. Masaya Sawamura, and received his PhD in 2012. In 2012, he joined the group of Prof. Kenichiro Itami at Nagoya University as a JSPS postdoctoral research fellow. In 2013, he became a Lecturer in the same group and was promoted an Associate Prof. in 2018. His research focuses on the development of new catalysts and synthetic methods for nanocarbons science and polymer science, and recently he received a lot of awards and honors such as Chemical Society of Japan Award for Young Chemists (2019), PCCP prize (2018), Akasaki Award (2019) and ACS Cat. Early Career Advisory Board (2020).

**Date:** 24<sup>th</sup> July 2020, Friday  
**Time:** 2.00pm to 3.30pm  
**Venue:** Zoom Platform  
**Host:** Assistant Professor Ito Shingo

**For Zoom registration:**

