MOF ナノ空間によるグラフェンナノリボンの精密合成

（東大院工[1]・JST さきがけ[2]）○北尾 岳史[1,2]・中田 和希[1]・植村 卓史[1]
Precise synthesis of graphene nanoribbon in metal-organic framework
([1]*The University of Tokyo*, [2]*JST-PRESTO*) ○ Takashi Kitao,[1,2] Kazuki Nakata,[1] Takashi Uemura[1]

Graphene nanoribbons (GNRs) have recently attracted increasing interest because of their tunable optical, electronic, and magnetic properties achieved through the tailoring of their edge structure and width. However, the widespread implementation of GNRs into the various optelectronic devices has yet to be realized, as methods for the synthesis of GNRs in precise and scalable fashion are currently lacking. Metal–organic frameworks (MOFs), porous materials formed through the self-assembly of metal ions and organic ligands, have been applied to a variety of applications, including gas storage, separation, and catalysis. MOFs have the advantages of the tunable and regulated nature of their nanospaces and have been shown to provide an ideal compartment for controlling the arrangement of guest species through the geometrical constraint of host pores[1]. Here, we report on the precise and scalable synthesis of GNRs utilizing the one-dimensional nanochannels of MOFs (**Fig. 1**)[2].
Keywords : Metal-Organic Framework; Graphene Nanoribbon; Optoelectronic properties

グラフェンナノリボン（GNR）は、高い電子移動度を有し、様々な光電子デバイスへの利用が期待される機能性ナノ炭素材料である。GNR はリボン幅やエッジ構造に応じて異なる電子物性を示すため、その構造制御は非常に重要である。一方、多孔性金属錯体(MOF)は、その構成要素を適切に選択することで、サイズ、形状、表面環境など、細孔構造を緻密にデザインすることが可能である[1]。本研究では、MOF が有する一次元ナノ細孔内で多環芳香族化合物を重合することで、原子レベルで構造が制御された GNR を高効率・高収率で合成することに成功した(**Fig. 1**)[2]。

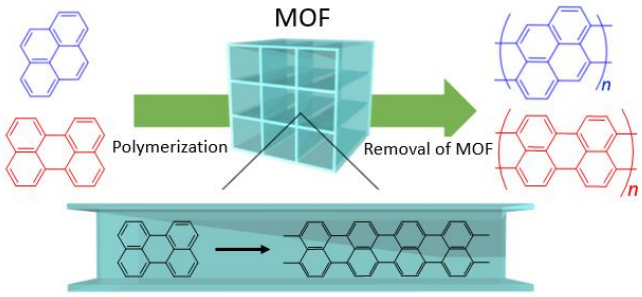

Fig. 1. Schematic image for synthesis of GNRs using a MOF as the host.

References

1. T. Kitao, Y. Zhang, S. Kitagawa, B. Wang, T. Uemura, *Chem. Soc. Rev*., **2017**, *46*, 3108-3133.
2. a) T. Kitao, M. W. A. MacLean, K. Nakata, M. Takayanagi, M. Nagaoka, T. Uemura, *J. Am. Chem. Soc.,* **2020**, *142*, 5509-5514. b) X. Zhang, T. Kitao, D. Piga, R. Hongu, S. Bracco, A. Comotti, P. Sozzamo, T. Uemura, *Chem. Sci.*, **2020**, *11*, 10844-10849.