

Synthesize Lewis Acid and Base Containing 2D Material

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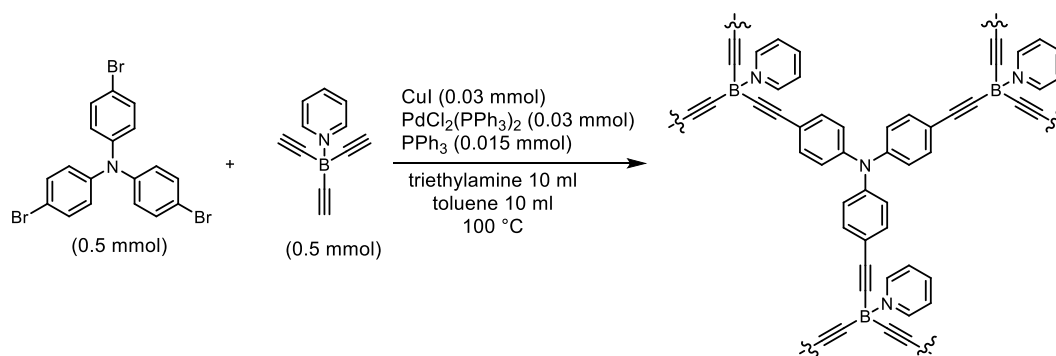
Lewis acid- and base-containing materials attract much interest as multifunctional catalysts. The previous example of such 2D materials is graphene co-doped with nitrogen and boron.^[1] However, this material have problems of randomness and uncontrollability of structure. It is difficult to control the bonding state of this material because of the annealing process. To solve these problems, we try to synthesize the 2D carbon skeletons using monomers with Lewis acid-base moieties and controlling their alignment at the molecular level.

In this study, we use alkyne (triethynylborane) with Lewis acid and aryl halide (tris(4-bromophenyl) amine) with Lewis base moieties in the Sonogashira-Hagihara coupling polymerization (**B-N Polymer**, Scheme 1). In general, the three-coordinate boron molecules are difficult to handle because of their high reactivity. Therefore, we use pyridine for protecting the boron moiety to inhabit the acid-base reaction between triethynylborane and tris(4-bromophenyl) amine before cross-coupling.

We analyzed product structure with SEM, IR, TG-MS, and XPS (Figure 1).

References

- [1] Y. Sun, C. Du, G. Han, Y. Qu, L. Du, Y. Wang, G. Chen, Y. Gao and G. Yin, *Electrochim. Acta*, **2016**, *212*, 313–321.



Scheme 1: Reaction scheme

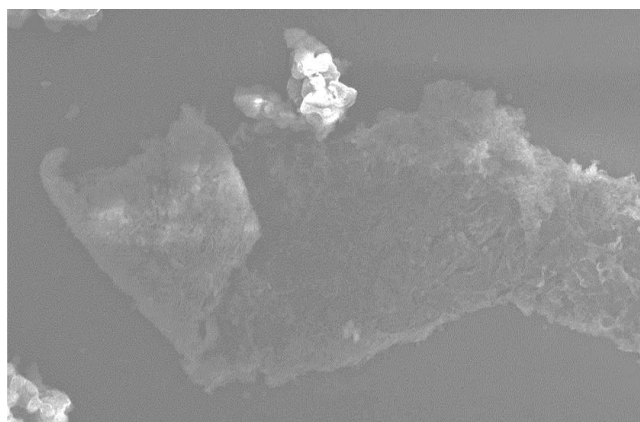


Figure 1: SEM image

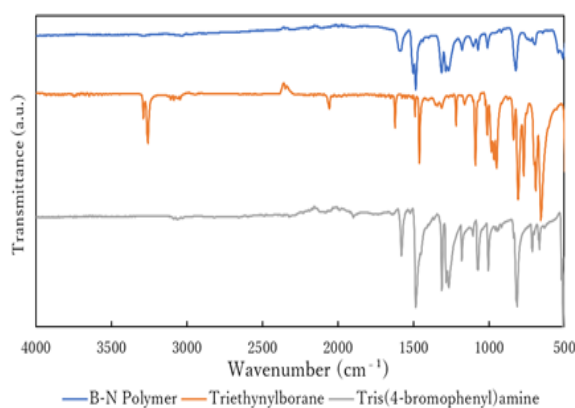


Figure 2: IR spectrum