Graphdiyne/graphene (GDY/G) Hybrid Supported Atomic Palladium Catalyst for Aromatic Nitroreduction

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Atomically dispersed catalysts with mono-nuclear metal complexes or single metal atoms anchored on supports can expose a maximum number of active sites, maximize the atom utilization efficiency and reaction selectivity, which have recently emerged as promising new heterogeneous catalysts, especially in organic transformations.[1,2] Graphdiyne (GDY), a relatively new two-dimensional (2D) planar carbon allotrope, is favorable for chelating single metal atoms and greatly contributed to strong charge transfer between the metal atoms and the GDY due to abound the carbon-carbon triple bonds.[3,4] In this work, we synthesized bulk few-layered GDY on graphene sheets through Eglinton coupling reaction (Figure 1). Then, GDY/G hybrid supported atomic Pd catalyst (Pd_1/GDY/G) was prepared through a wet chemistry. The Pd_1/GDY/G was applied in aromatic nitroreduction and presents high catalytic activity and long-term cycling properties, in which the graphene plays an essential role of electron transfer that will enhance the catalytic activity of Pd_1/GDY/G

References

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[3] X. P. Yin, H. J. Wang, S. F. Tang, X. L. Lu, M. Shu, R. Si, T. B. Lu, Angew. Chem. Int. Ed., 57 (2018), 9382-9386.
[4] Y. Xue, B. Huang, Y. Yi, Y. Guo, Z. Zuo, Y. Li, Z. Jia, H. Liu, Y. Li, Nat. Commun., 9 (2018), 1460.

Figures

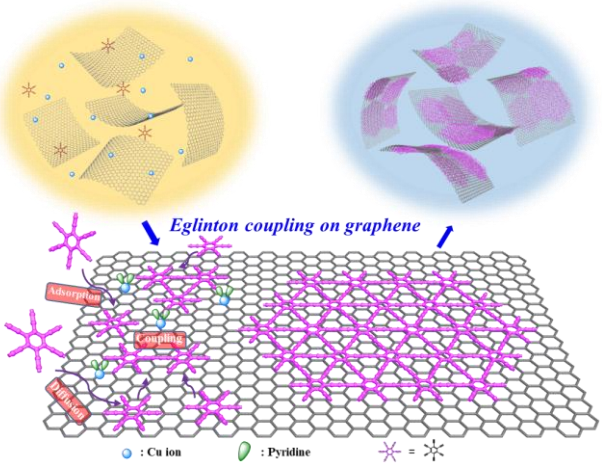

Figure 1: Schematic illustration of the experimental setup for the GDY/G synthesis through Eglinton coupling reaction.

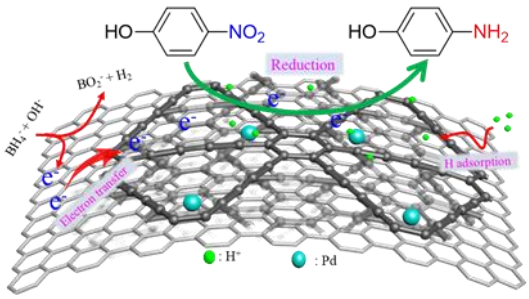

Figure 2: Schematic illustration of the mechanism of 4-nitrophenol reduction, in which the graphene plays a role of electron transfer that will enhancing the catalytic activity of Pd_1/GDY/G.