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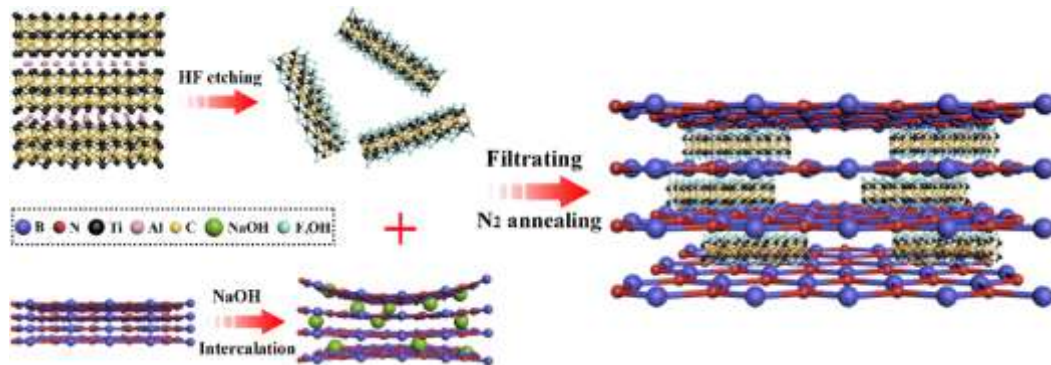
## **BNNS@Ti<sub>3</sub>C<sub>2</sub> Intercalation Electrocatalyst for Hydrogen Evolution Reaction**

Electrocatalysts with advantages of stability, high efficiency and noble-metal-free feature are in urgent need for water splitting [1-2]. Herein, we firstly utilized the intercalation method to incorporate Ti<sub>3</sub>C<sub>2</sub> into interlayers of boron nitride nanosheet (BNNS) and fabricated a novel BNNS@Ti<sub>3</sub>C<sub>2</sub> intercalation electrocatalyst. Theoretical calculation proves that the interface has transformed from semiconducting property to metallicity in the unique intercalation structure. The rich active sites of Ti<sub>3</sub>C<sub>2</sub> are better protected as well as serve as a bridge to connect different layers of BNNS [3]. The as-obtained composite possesses the improved conductivity and abundant catalytic active sites which are useful for enhancing electrocatalytic performance. As a non-noble-metal electrocatalyst, the sample shows an outstanding electrocatalytic activity and excellent long-term durability. BNNS@Ti<sub>3</sub>C<sub>2</sub> is used as the electrocatalyst for the first time without noble-metal assistance. This work demonstrates that the layered 2D materials can serve as a promising electrocatalyst by forming intercalation structure.

### **References**

- [1] D. Merki, X. Hu, *Energy Environ. Sci.* 4 (2011) 3878–3888.
- [2] J. Yang, H.S. Shin, *J. Mater. Chem. A* 2 (2014) 5979–5985.
- [3] X. Li, X. Hao, M. Zhao, Y. Wu, J. Yang, Y. Tian, G. Qian, *Adv. Mater.* 25 (2013) 2200-2204.

**Figure 1**



**Figure 1:** Schematic illustration for the synthesis of BNNS@Ti<sub>3</sub>C<sub>2</sub>.