Nanoscale Assembly of 2D Materials for Energy & Environmental Applications

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Since the pioneering discovery of graphene, many interesting 2D materials, such as graphene oxides, TMDs, MXene and *h*-BN, has attracted enormous research attentions. How to design the rational architecture of those 2D materials is crucial for the realization of their profound implications in real-world applications, including energy and environmental fields. In this regard, nanoscale assembly, precise control over the orientational/positional ordering and complex interface among 2D layers, is essential for continued progress of 2D materials especially for energy storage/conversion and environmental remediation. This presentation will highlight the recent progress, status, future prospects, and challenges associated to the nanoscopic assembly of 2D materials, particularly targeting at energy and environmental applications. Geometric dimensional diversity of 2D material assembly is focused based on the novel assembly mechanisms, including 1D fiber from colloidal liquid crystalline phase, 2D film by interfacial tension and 3D nanoarchitecture assembly by electrochemical process. Relevant critical advantageous of 2D material assembly will be introduced for the application fields, including secondary batteries, supercapacitors, catalysts, gas sensors, desalination, and water decontamination.

References

[1] G. H. Jeong, S. P. Sasikala, T. Y. Yun, G. Y. Lee, W. J. Lee*, S. O. Kim* Advanced Materials, in press.
[2] S. P. Sasikala, J. Lim, I. H. Kim, H. J. Jung, T. Y. Yun, T. H. Han*, S. O. Kim*, Chemical Society Reviews, 47 (2018) 6013.

Figures

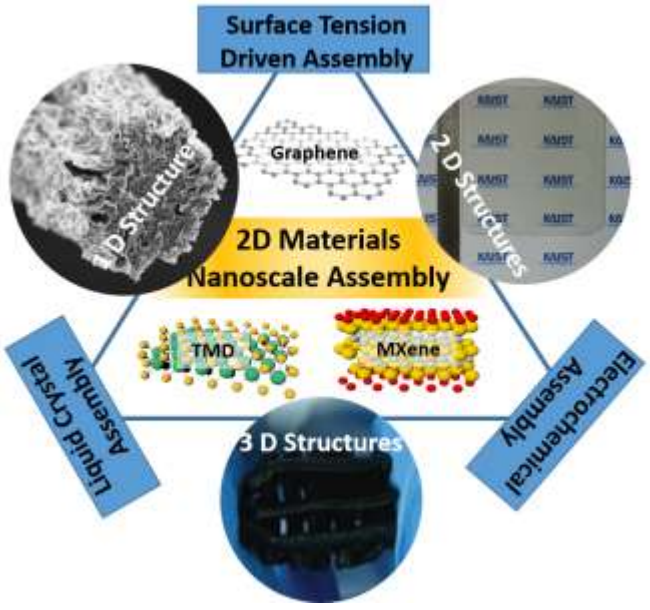

Figure 1: Schematic illustration for nanoscale assembly of 2D materials