2D Layered Materials for Sustainable Energy Storage

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Electrochemical energy storage technologies have been brought into the spotlight as they provide elegant and efficient approaches to store, transport, and deliver energy harvested from sustainable energy resources.[1-2] The demand for power and energy supply is equally imperative in actual use and is keen to expand in the future. Thus, it is highly desirable to design new electrode materials or rationally re-construct the recognized electrode materials for energy storage devices to mitigate the power-energy tradeoff. In this talk, I will present our recent efforts in exploring 2D layered organic/inorganic materials for sustainable energy storage applications.[3] I will present several interlayer engineering strategies for inorganic 2D layered materials to regulate the ion transport behaviors and boost the power-energy performance of the assembled energy storage devices.[4-6] I will show 2D carbon-rich frameworks as promising electrode alternatives for high-power energy storage devices by demonstrating 2D polyarylimide covalent organic framework (COF) for multivalent metal batteries[7-8] and dual-redox-site 2D conjugated metal-organic frameworks as pseudocapacitive electrodes[9-10]. Moreover, I will introduce our latest efforts in manipulating interfacial ion behaviours by the manner of constructing 2D crystal polymer-based artificial electrode skin and precisely electrolyte engineering.[11-12]

References:

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