**MXene derived 2D hybrid structures for energy storage applications**

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Two-dimensional (2D) materials have attracted great attention in both fundamental studies and various applications. In particular, they show high potential in various energy storage and conversion applications, owing to their fascinating structural features, unique electronic and mechanical properties. Nanospace-confined synthesis has been demonstrated as an efficient strategy to develop low-dimensional nanomaterials or heterostructures with well-defined morphology and good structural stability.[1] The process can be realised by either growing target materials in the pre-designed nanospaces or converting the pre-loaded precursors into target phases within nanospaces. The growing process of target materials could be highly controllable by selecting suitable precursors and nanospace matrix. For example, due to the diversity of carbon materials and their wide application in energy related fields, various carbonaceous matrixes including graphene, carbon nanotubes, and meso- or microporous carbons have been reported as nanospace templates to direct the growth of other nano-objects, simultaneously achieving carbon based hybrid structures.[2, 3] The existence states of precursor such as composition, crystallinity, are crucial to determine the morpholgy and crystal structure of the final product. MXenes are an exciting family of 2D layered transition-metal carbides or carbonitrides first reported by Gogotsi et al. in 2011.[4] Delaminated single-layer MXene with atomic level thickness will be an ideal precursor to synthesise other low dimensional metal compounds like sulfides or nitrides. Recently, we developed a nanospace-confined strategy to realize the controllable conversion of MXene to 2D metal sulfide or nitride nanostructures. A new class of MXene derived 2D hybrid structures including TiS2@C nanosheets, TiN@C nanomeshes have been demonstrated with enhanced electrochemical performance in energy storage applications such as Na-ion or metal-sulfur batteries [5-7].

**References**

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