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Constructing of ultrathin 2D material for highly efficiency electrocatalysis

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Two dimensional materials possess inherent advantages to improve electrocatalytic performance. First, two dimensional nanosheets have large surface–volume ratio, which can promote the adsorption of substrates and provide high specific surface area for electrocatalytic reactions. Moreover, the 2D nature of the nanosheets indicates short diffusion distance for electrons, which causes faster charge transfer rate and better turnover frequency. Therefore, Constructing of 2D ultrathin nanosheets is an effective strategy to achieve high electrocatalytic performance. Our group recently reported a series of 2D ultrathin materials: (1) Bimetal ultrathin metal-organic frameworks (MOFs) nanosheets were successfully prepared through a simple ultrasonic oscillation method. Due to the ultrathin feature, the surface metal atoms are highly coordinated unsaturated, which greatly benefit the adsorption process, thus offering outstanding performance. Besides, two kinds of metal atoms could generate the coupling pair, which could effectively promote the charge transfer.1 (2) On the basis of ultrathin nanosheets, novel 3D flower-like Ni2P were synthesized through the self-assembly of ultrathin Ni2P nanosheets, which retain the 2D structural advantages and offer faster electrons transfer compared with dispersed unassembled 2D nanosheets.2 (3) To further optimized the catalytic performance, 3D porous core-shell ultrathin nanosheets were prepared via a facile stepwise hydrothermal method. The ingenious architecture possess numerous channels for the diffusion of substrates, ideal pathway for electron transfer and larger area for adsorption compared with imporous nanosheets. Collectively, our constructing strategy provided a successful practice to prepare a series of high-efficient catalysts.

Biography:

Ge Wang received her Ph.D. in Chemistry from the Michigan Technological University in 2002. Currently she is a professor and Ph.D. supervisor in the School of Material Science and Engineering at the University of Science and Technology Beijing. In 2012, she became a special chair professor endowed by the Chang Jiang Scholars Program of the Ministry of Education. Her research interests focus on creating complex materials structures with nanoscale precision using chemical approaches, and studying the functionalities including catalytic, energy storage and energy saving properties etc.

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