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In-suit Assembled MoS_2/Reduced Graphene Oxide Aerogels as an Efficient Catalyst Application for HER Electrocatalysis

Layered transition metal dichalcogenides (TMDs) semiconductor MoS_2 composed of three-atom stacked layers (S-Mo-S) has been recognized as one of the most common candidates of HER electrocatalysts due to their low-cost, naturally abundant and electrocatalytic activities, and somehow can be considered as the pioneer of this class of electrocatalysts [1]. At the same time, it is vital role of carbonaceous nanomaterials that as a catalyst support for the development of any potential HER electrocatalyst, even in the case of noble metal catalysts [2-3]. In this work, the 3D non-noble MoS_2/rGO hybrid aerogels catalysts was successfully synthesized, made up of the 2D layered transition mental dichalcogenides (TMDs) MoS_2 nanoflowers and the 3D carbonaceous nanomaterials rGO aerogels, via a one-pot hydrothermal route. In the hybrid 3D MoS_2/rGO aerogels, rGO aerogels act as catalyst support for MoS_2, while the MoS_2 nanoflowers tight and well-decorated on the rGO nanofilms, which allows the hybrid aerogels with a very large surface area, defective structure, abundance of active sites, and high conductivity. All the above factors make the hybrid aerogels are characterized by excellent optimization in electrocatalytic hydrogen evolution reaction (HER).

References

[1] Yang S, Feng X, Ivanovici S, Mullen K, Angewandte Chemie-International Edition, 49 (2010) 8408-8411.
[2] Wang H, Robinson J T, Li X, et al., Journal of the American Chemical Society, 131 (2009) 9910.
[3] Zhu C, Liu T, Qian F, et al., Nano Letters, 16 (2016) 3448-3456.

Figures

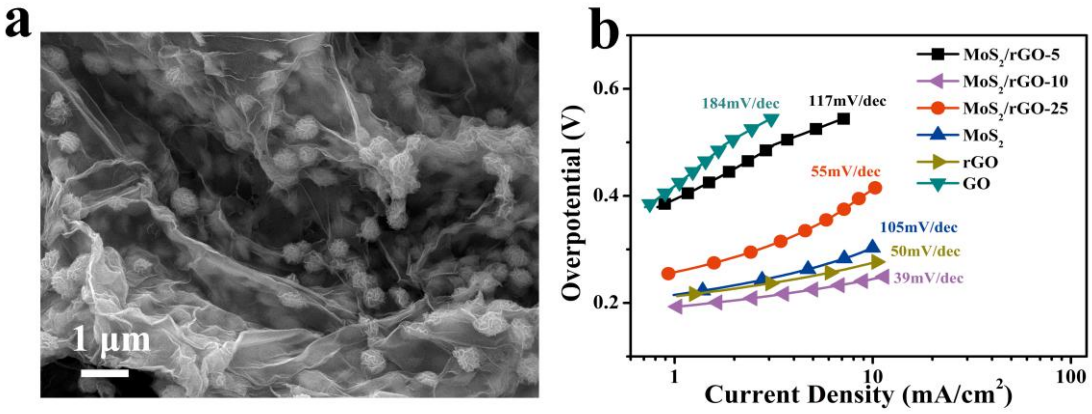

Figure 1: SEM image of MoS_2/rGO-10 sample (a) and the Tafel plots of the MoS_2/rGO with the content of 5 wt%, 10 wt%, 25 wt%, MoS_2, rGO and GO.