Dendritic, Transferable, Strictly Monolayer MoS₂ Flakes Synthesized on SrTiO₃ Single Crystals for Efficient Electrocatalytic Applications

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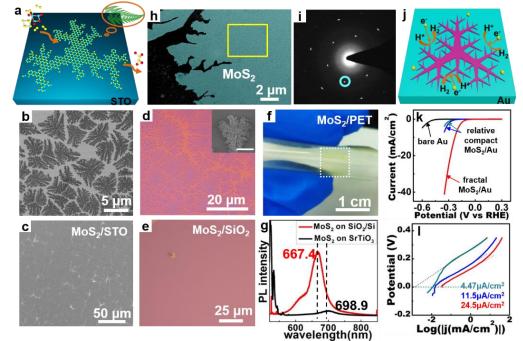
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Abstract

Controllable synthesis of macroscopically uniform, high quality monolayer MoS₂ is crucial for harnessing its great potentials in optoelectronics, electrocatalysis and energy storage. To date, triangular MoS₂ single crystals or their polycrystalline aggregates have been synthesized on insulating substrates of SiO₂/Si, mica and sapphire, *etc.*, *via* portable chemical vapor deposition methods. Herein, we report a controllable synthesis of dendritic, strictly monolayer MoS₂ flakes possessing tunable degrees of fractal on a specific insulator SrTiO₃. Interestingly, the dendritic monolayer MoS₂ characterized with abundant edges can be transferred intact onto Au foil electrodes and serve as ideal electrocatalysts for hydrogen evolution reaction, reflected by a rather low Tafel slope of~73 mV/decade among CVD-grown two-dimensional MoS₂ flakes. In addition, we reveal that centimeter-scale uniform, strictly monolayer MoS₂ films consisting of relatively compact domains can also be obtained, offering insights into promising applications such as flexible energy conversion/harvesting and optoelectronics.

References

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