

Facile large-scale production of atomically thin MoS₂

Félix Carrascoso-Plana

Patricia Gant, Gabriel Sánchez-Santolino, Norbert Marcel Nemes, José Antonio Alonso, Federico Mompeán, Riccardo Frisenda, Andrés Castellanos-Gómez.

Material Science Factory, Instituto de Ciencia de Materiales de Madrid (ICMM-CSIC), Calle Sor Juana Inés de la Cruz, 3, 28049, Madrid, Spain.

felix.c@csic.es

The interest of two dimensional transition metal dichalcogenides (TMDCs) has increase in recent years. Among these materials, molybdenum disulphide (MoS₂) has gained popularity for electronic and optoelectronic applications as it presents a high in-plane mobility and a large current ON/OFF ratio when a single layer of this material is used in a field-effect transistor [1].

Mechanical and chemical exfoliation have been the most used methods to obtain high quality two dimensional MoS₂ [2,3]; nevertheless, random deposited flakes, a poor control over thickness and small coverage area are some of the problems that usually appear by employing these techniques. Therefore, in order to solve these issues, synthesis of large-area methods like chemical vapour deposition [4] or the sulfuration of sputtered molybdenum thin films [5] are used.

Here, we present an alternative technique to obtain atomically thin MoS₂ films by sulfurating crystalline molybdenum trioxide (MoO₃) flakes, see figure 1 for the optical picture of such a film. In addition, the resulting layers have been characterized by different methods like x-ray diffraction, transmission electron microscopy and transmission optical spectroscopy.

References

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Figures

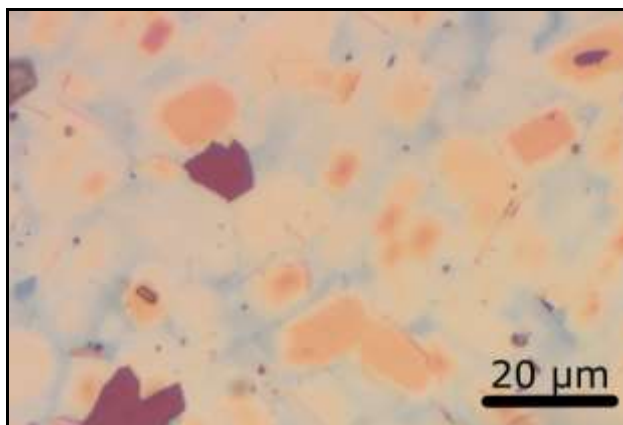


Figure 1: Optical image of a large area MoS₂ layer obtained by sulfurating a MoO₃ flake.
