

Electronic Structure of the Elusive Metastable State in Chemically Exfoliated Few Layer MoS₂

D. D. Sarma

*Solid State and Structural Chemistry Unit, Indian Institute of Science, Bengaluru 560012,
INDIA*

E-mail: sarma@sscu.iisc.ernet.in and Sarma.dd@gmail.com

An elusive metastable phase, existing only as small patches in chemically exfoliated few layer, thermodynamically stable 2H phase of MoS₂ is believed to influence critically properties of MoS₂ based devices. Its electronic structure is little understood in absence of any direct experimental data and conflicting claims from theoretical investigations. I shall present data¹ to conclusively resolve this issue based on probing the electronic structure of chemically exfoliated few layer systems using spatially resolved photoemission spectroscopy and show that the dominant belief in the community is qualitatively incorrect, requiring reinterpretations of almost all existing literature claims. Specifically, our results establish that the dominant metastable phase formed on chemical exfoliation of MoS₂ is the distorted, semiconducting 1T' phase rather than the metallic 1T phase as has been believed so far.

This work is carried out in collaboration with Banabir Pal, Anjali Singh, Sharada. G, Pratibha Mahale, Abhinav Kumar, S. Thirupathaiah, H. Sezen, M. Amati, Luca Gregoratti, and Umesh V. Waghmare.

References:

[1] Banabir Pal et al., Unpublished