

The 3×3 charge density wave in quasi-freestanding monolayer TaS₂

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We report on the 3×3 charge density wave (CDW) in a quasi-freestanding monolayer of TaS₂, as grown by molecular beam epitaxy on graphene on Ir(111) [1]. Investigated by scanning tunnelling microscopy, the 3×3 periodicity of the CDW is visible at liquid helium temperatures, and allows analysis of spatial CDW amplitude variations and the influence of point and line defects. Performing low temperature scanning tunnelling spectroscopy (STS) reveals a decreased density of states at the Fermi energy, indicating partial gapping of the Fermi surface. We investigate the influence of the environment on the CDW state and in constant current STS maps, an energy dispersive standing wave pattern is found, which firstly illustrates the quasi-freestanding nature of the TaS₂ islands and secondly allows partial determination of the band structure, which is compared to data from angle resolved photoemission spectroscopy of the same system.

[1] Hall et al., *2D Materials* 5, 025005 (2018).