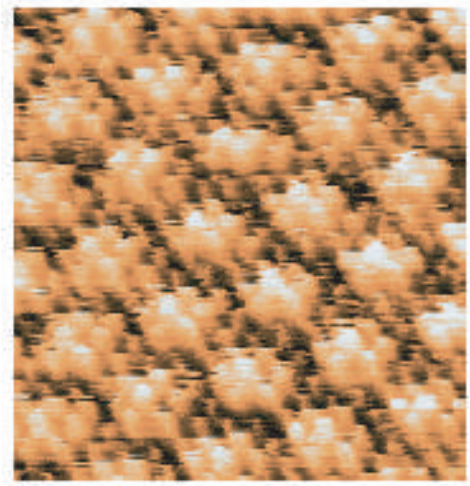
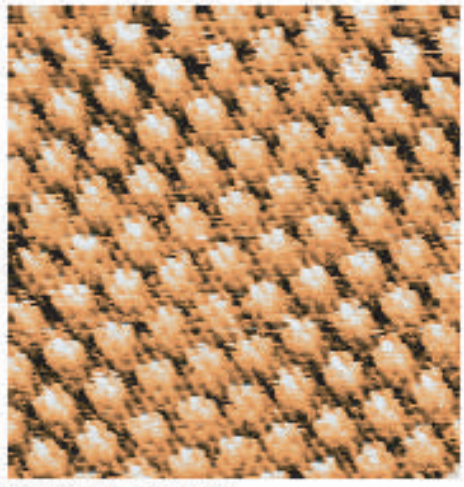
Charge Density Waves observed on TaS_2

Nanosurf® STM Application Note

TaS_2 (and $TaSe_2$) exhibit an electronic phase transition from a normal into a condensed state which is called the Charge Density Wave (CDW) state [1]. The transition is caused by an electron-phonon coupling. STM images of TaS_2 show a triangular atomic lattice (a_0=0.33 nm) with a superimposed CDW lattice of about 3.5 a_0.



scan size: 5.4 nm



scan size: 10.7 nm

To observe CDW typical tunnelling parameters of 2-3 nA and 10-20 mV gap voltage were observed. The atomic lattice can be seen simultaneously when the current is increased to higher values (30 – 40 nA).

[1] R. Wiesendanger et al. p.161ff, Scanning Tunneling Microscopy I, Springer 1992

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