

Atomic structures of self-assembled epitaxially grown GdSi_2 nanowires on $\text{Si}(001)$ by STM

GdSi_2 nanowires grown over Si substrates were investigated using scanning tunnelling microscopy (STM) in order to observe its structure and propose a structure model.

Sample preparation

There is no mention of special sample preparation to perform STM.

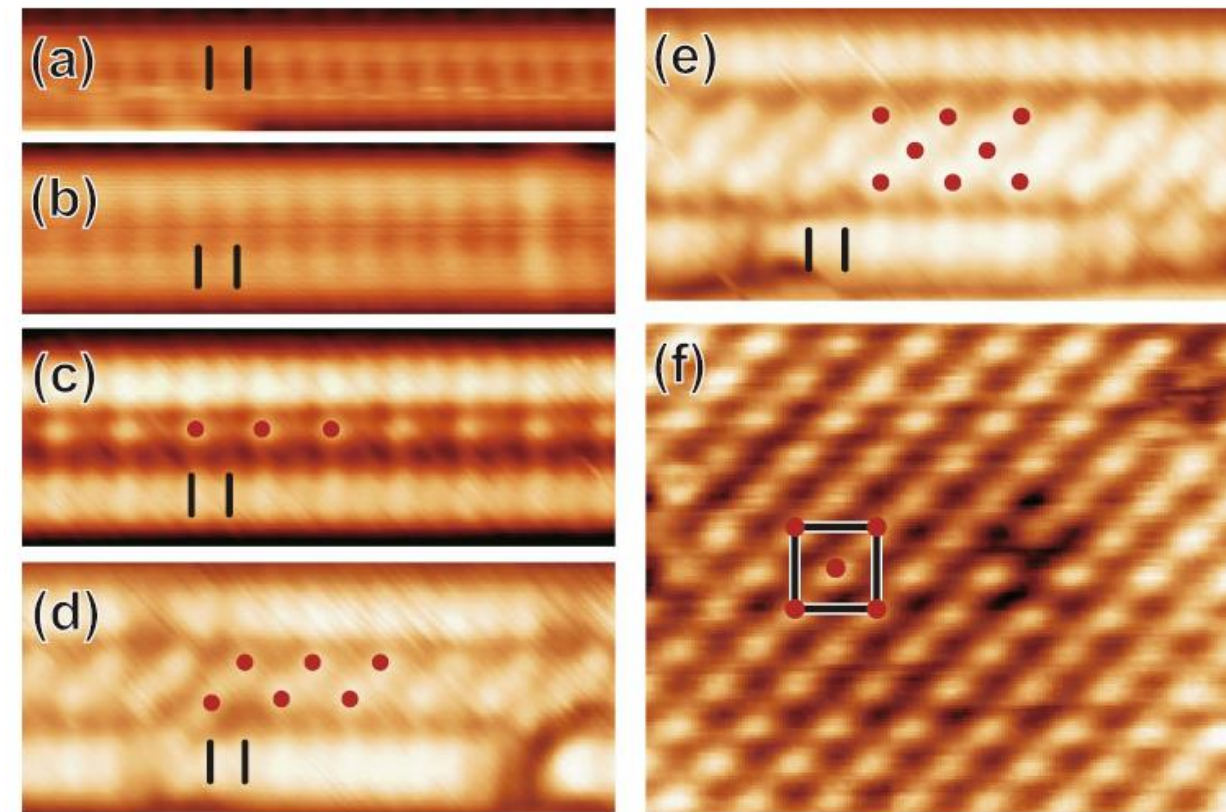
Data acquisition conditions

The images shown at the right were obtained using a commercial variable temperature STM (Omicron, Germany) operated at room temperature, additional images not shown in the slide were obtained using a commercial cryogenic STM (SPECS, Germany) at 78 K.

The images were measured at 0.1 nA, -1 V in (a,b and f) and 0.1 nA, $+1$ V in (c–e).

Results

The analysed nanowires structure depends on the width of the wire. a_0 being the Si lattice constant: 0.384 nm, wires wider than $5a_0$ exhibiting a different structure in the centre of the wire absent in narrow wires, this structures continues changing with increasing width and when the wire reaches $8a_0$ the central structure is that of a 2D silicide island.



Atom resolved STM images of the nanowires of different widths (a) $4a_0$, (b) $5a_0$ (c) $6a_0$ (d) $7a_0$ and (e) $8a_0$ and (f) the silicide island.

Black bars on the edge of the NWs and red dots on the center of the NWs in (c–e) show the periodicities along the edge and the center of the NWs, respectively. The black box with red dots in (f) shows the $c(2 \times 2)$ structure on the silicide island.