

Thursday 19.05.2011, 15:15-16:15 SR 4.

Self-organizing Atomic Chains

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Abstract

The deposition of Pt on Ge(001) followed by annealing results into well-ordered nanowire arrays. These self-lacing nanowires are perfectly straight, thousands of atoms long and virtually defect free. The nanowires are composed of dimers that have their bond aligned in a direction parallel to the chain direction. At low temperatures the Pt nanowires undergo a phase transition: the periodicity of the nanowires doubles from a 2x to 4x periodicity and the electronic near the Fermi edge changes. In addition, at low temperatures novel quasi one-dimensional electronic states are found. These quasi one-dimensional electronic states originate from an electronic state of the underlying terrace that is confined between the nanowires. The electronic, structural as well some intriguing dynamic properties of the nanowires will be discussed. In the final part of the talk the adsorption of various molecules (CO, octanethiols and Cu-phthalocyanines) is addressed.

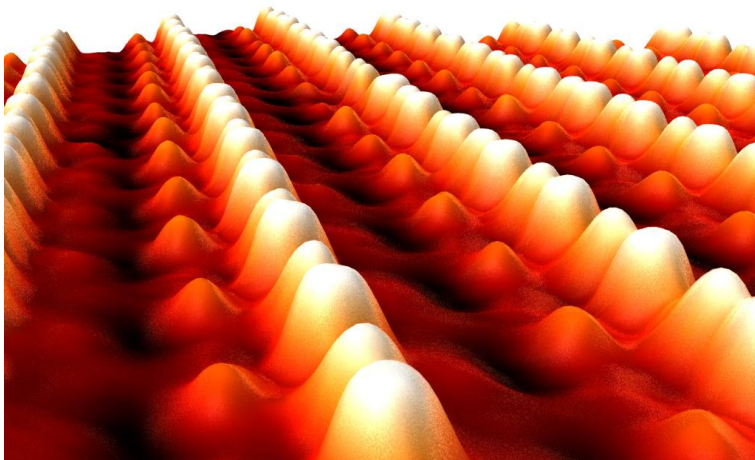


Figure caption

STM image of an array of self-organizing Pt chains on Ge(001)