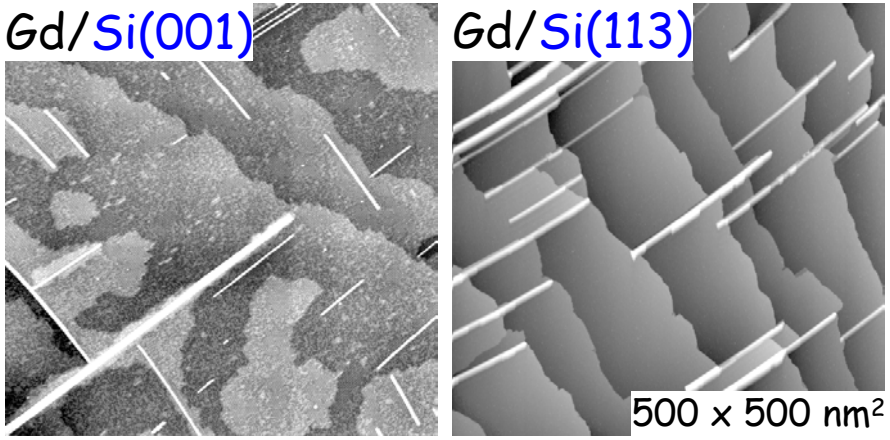
Structure and Reactivity of 1D Nanostructures on High-Index Silicon Surfaces

Alison Baski, Virginia Commonwealth University, DMR 0207643

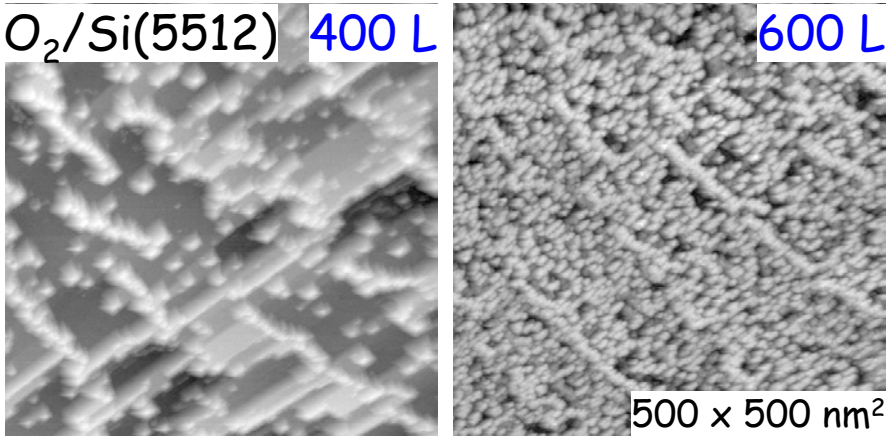
Silicon is the workhorse of the semiconductor industry. This NSF grant supports a fundamental study of one-dimensional nanostructures created by metal deposition and/or etching on "tilted," high-index silicon surfaces.

The surfaces are examined using scanning tunneling microscopy in order to "see" structures at the nanometer level.

This research has examined the growth of metal silicide nanowires (top figure) and the process of oxygen etching (bottom). These are two promising methods for manipulating surfaces at the nanometer scale.



STM images show bright "nanowires" formed by gadolinium growth on two different silicon surfaces.



STM images show bright islands formed by oxygen etching, where island density increases with exposure.

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Education

This grant has supported three M.S. students (John Skrobiszewski, Liz Morris, Pat Woodworth) who have graduated and now teach physics at nearby high schools.

The grant presently provides partial support for two PhD students (Jonathan Dickinson, Chris Moore), one MS student (Mary Willis), and two undergraduates (Matt Sievert, Lindsay Hussey).

Outreach

Graduate and undergraduate students in this grant have also been involved with the physical science outreach program directed by Dr. Baski. This program has delivered physical science lessons to 200 disadvantaged students in the National Youth Sports Program each summer at VCU, as well as sponsored visits to nearby Richmond City Elementary schools.

Dr. Baski demonstrates how two bulbs form a circuit during a lesson taught at Maymont Elementary .

During a lesson taught at Fairfield Elementary, students use a radio and electromagnet to make a cup into a loudspeaker.