2016

Elimination of Acoustic noise in STM Analysis of Polymer Crystallization on Au (111)

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Abstract

Organic molecules offer a potentially cheap and environmentally friendly alternative to traditional silicon based electronics. The main limitation is that they are not as conductive as their inorganic counter parts. By crystalizing organic molecules, it is possible to increase the conductivity so that they can be more competitive with silicon electronics. This project examines the crystallization of polymers through self-assembly on the Au(111) surface reconstruction. The success of the crystallization is characterized with scanning tunneling microscopy (STM). In order to achieve high resolution STM images, we examined acoustic isolation by enclosing the microscope within a rubber-coated box, which was not effective, and a cylindrical shell lined with open cell foam. This was determined by examining both the images and the tunneling current data both with and without the acoustic isolation. We were further able to demonstrate that acoustic noise, while it destroys the ability to take high resolution images, does not appear in the tunneling current, which has not been previously reported. Finally, we report on the ability to create flat terraces of the Au(111) surface.