

# Scientists Manipulate Atoms on a Rough 3-D Surface

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Ohio University nanoscientists have used a scanning tunneling microscope (STM) to manipulate individual atoms on a rough terrain. It is the first atom manipulation of its kind done on a three-dimensional surface.

Only a select group of scientists have manipulated individual atoms because the procedure requires atomic scale precision and control. Even greater precision and accuracy is required for atom manipulation on rough surfaces.

A movie of the atom extraction can be [viewed online](#).

"This technique is very useful to produce single atoms for atomic constructions. It also helps us understand one of the most fundamental subjects, interaction between the matters," said Saw-Wai Hla, the lead researcher and an associate professor of physics and astronomy at Ohio University. The research was published in a recent issue of *Physical Review Letters*.

To perform the manipulation, the researchers coat a custom-built, low-temperature STM tip with silver atoms. Some of the silver atoms are deposited by gently touching the tip to the silver surface. A three-dimensional image of the silver cluster is taken to determine ideal target zones for atom removal. Once ideal areas have been located, the silver-coated tip approaches the silver cluster — but they never make contact. Approaching the tip within less than a tenth of a nanometer of the cluster

loosens the top atom. Moving the tip laterally across the surface drags the loosened atom and results in extraction.

The STM tip does not have to come in contact with the cluster because close proximity of the atoms causes reduced binding. This concept is based on theory proposed by University of Central Florida researchers led by Professor Talat Rahman.

Source: by by LIZ LEITCH, Ohio University

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