Researchers Carve with Electricity at the Nanometer Scale

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By applying electric current through a thin film of oil molecules, engineers have developed a new method to precisely carve arrays of tiny holes only 10 nanometers wide into sheets of gold. The new system, called Electric Pen Lithography (EPL), uses a scanning-tunneling microscope, fitted with a tip sharpened to the size of a single atom, to deliver the charge through the dielectric oil to the target surface.

With EPL, the researchers can both see and manipulate their target at the same time, all without the constraints of the vacuum chamber required by similar processes. With such tight control, the researchers hope the relatively inexpensive procedure will have applications for crafting single DNA detection devices such as nanopores, nanoscale interconnects in biological and semiconducting devices, molecular sieves for protein sorting and nanojets for fuel or drug delivery.

Mechanical engineer Ajay Malshe of the University of Arkansas, his students Kumar Virwani and Devesh Deshpande, and co-investigator Kamalakar Rajurkar of the University of Nebraska, Lincoln will present the new innovation at the International Institution for Production Engineering Research General Assembly in Antalya, Turkey, Aug. 21-27.

Source: The National Science Foundation

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