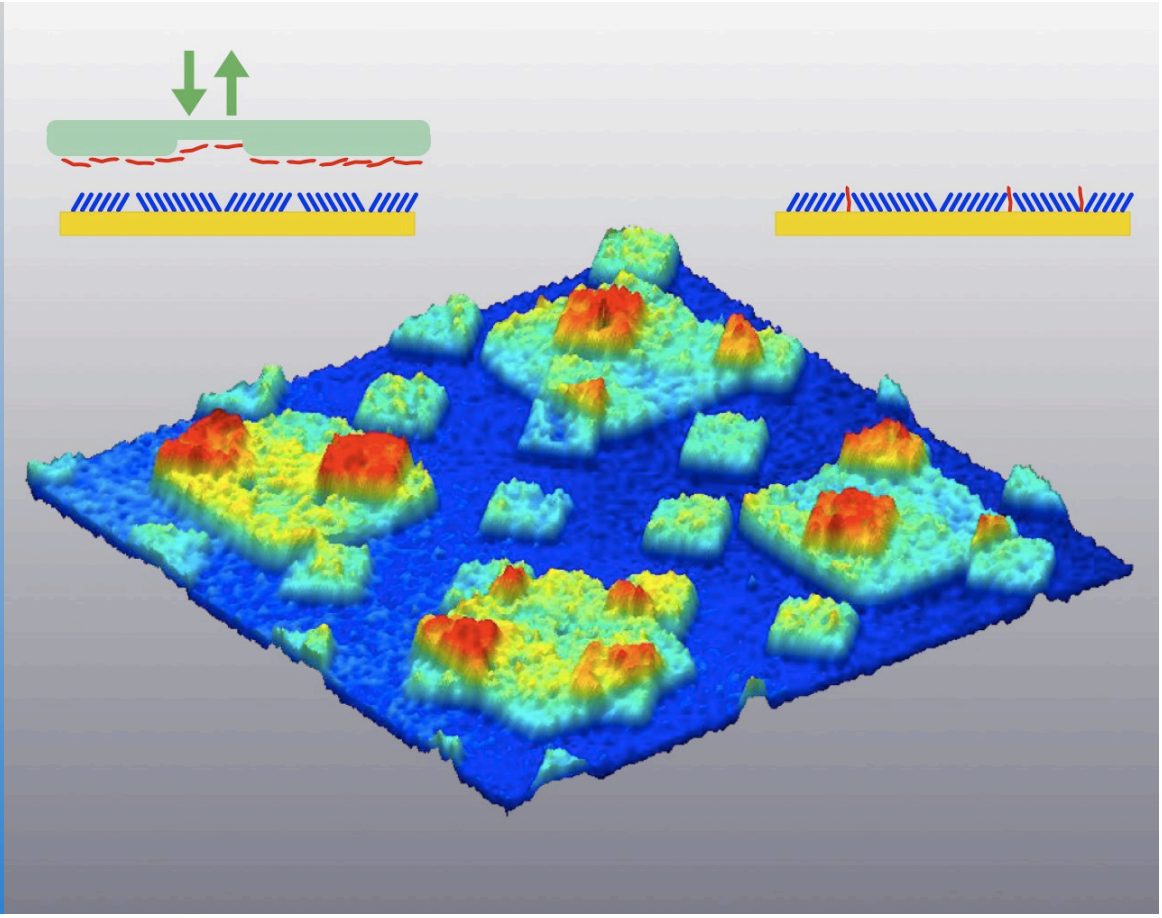
MICRO INSERTION

Penn State MRSEC



Patterns formed when a molecular ink displaces an existing self-assembled monolayer. Appl. Phys. Lett. **90**, 063114, (2007).

Placement, isolation and patterning
flaw follows function

IRG1

Normally, well, flaws are bad. But through a newly developed technique of microcontact insertion printing, Penn State researchers can use the flaws in a self-assembled monolayer to place individual isolated molecules in predetermined patterns on a gold substrate. A self-assembled monolayer is a tightly packed well-ordered array of molecules covering a surface, all tilted to one side like a cornfield in a windstorm. But the direction of the tilt is different in different parts of the sample. Where two domains of different tilt collide, a defect results, a molecule-sized hole in the monolayer. By judiciously building these defects into the surface, and then filling them selectively by pressing the surface with a patterned stamp, we can place isolated molecules in predesigned nano-scale or micro-scale patterns. Using a series of stamps, each embossed with a different pattern and coated with a different target molecule, we can build up a complex multicomponent pattern. If these isolated target molecules are designed to capture specific analytes, then complex solutions containing biomolecules or environmental contaminants can be separated and analyzed by this nanoscale "smart surface."