Bombarding a solid surface with a broad ion beam can produce a remarkable variety of self-assembled nanoscale patterns. The spontaneous emergence of these patterns is not just fascinating in its own right, since in the future ion bombardment may prove to be an important tool in the fabrication of nanostructures.

As an introduction to the field, the question of why oblique-incidence ion bombardment often produces periodic height modulations or “ripples” on a solid surface will be addressed. I will then move on to discuss our recent theoretical work that explains experimental observations of exotic new kinds of nanostructures, including terraced surfaces, highly ordered arrays of nanoholes, and disordered herringbone patterns.

Biographical Sketch

R. Mark Bradley received his B.Sc. in physics and mathematics from the University of Toronto in 1979, and his doctorate in theoretical condensed matter physics from Stanford University in 1985. After postdoctoral work at the IBM T.J. Watson Research Center, he joined the faculty of the Department of Physics at Colorado State University in 1987, where he now holds the rank of professor. His research on nanoscale patterns produced by ion bombardment of solids is supported by the National Science Foundation.