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Novel Imaging and Nano Fabrication with a Focused Beam of Helium Ions JOHN NOTTE, Carl Zeiss, Microscopy — A newly introduced commercial instrument can produce a focused beam of helium ions with a focused probe size of 0.35 nm, and an energy range from 5 to 35 keV. While using only small beam currents (0.1 to 10 pA), it provides a means of generating images with high lateral resolution and surface specific information. The imaging is based up the generation of detectable particles (such as secondary electrons) as the beam interacts with the sample. Although similar to the scanning electron microscope, this instrument offers several unique imaging advantages. In addition to imaging, the focused helium beam has also been used for fabrication at the nanometer scale. Recent result have shown that this beam can be very effective for sputtering away materials to produce fine patterns for applications in biosensors, graphene, and plasmonic devices. The helium beam has also been used for lithographic purposes, producing 7 nm features with no apparent proximity effects. In another application, when the beam interacts with adsorbed molecules, the molecules are fixed – permitting the fabrication of three dimensional nano-structures. A review of the recent work, and future plans will be presented.

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