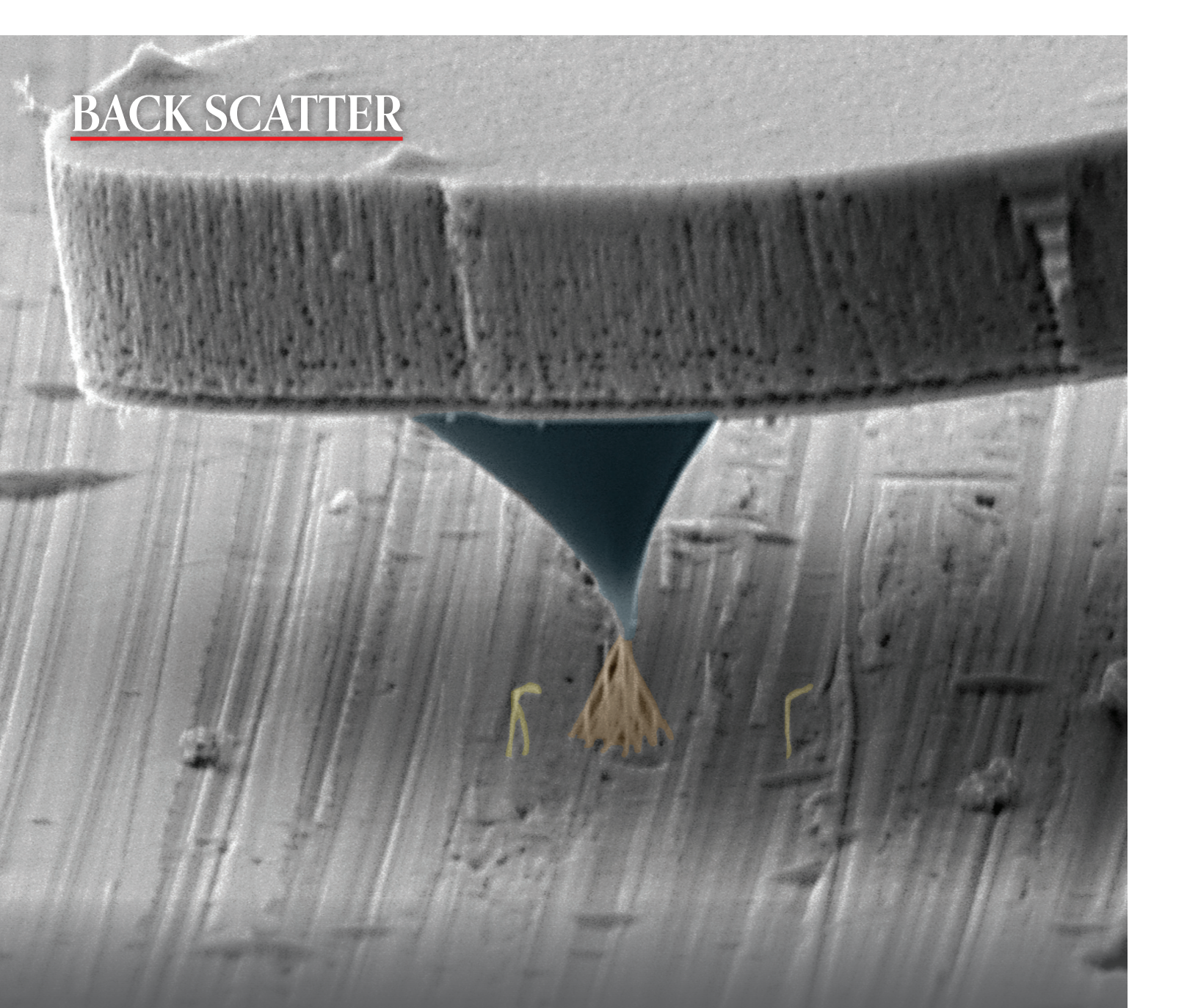


BACK SCATTER



Nanoscale 3D printing

Focused electron beam–induced deposition (FEBID) is a 3D nanoprining technique capable of producing intricate metal-based nanostructures with exceptional design flexibility. All that’s needed are a conventional scanning electron microscope (SEM) and a continuous source of gaseous precursor molecules, typically metal–organic compounds.

In the SEM, the molecules spread out over the surface of the fabrication substrate, and those in the focus of the electron beam become dissociated. Although volatile fragments quickly dissipate, nonvolatile components, including the metal constituents, will stick. A stationary SEM beam will make a vertical pillar of deposits, and a slowly moving beam will generate a sloped one. By controlling the motion of the beam and the angle of

the substrate, one can create a vast array of complex 3D nanostructures with features as small as 10 nm. The technique, which can be applied to arbitrarily shaped substrates, has diverse applications in nano-optics, nanomagnetism, scanning probe microscopy, particle trapping, and more.

This SEM image shows an atomic force microscope (AFM) cantilever with its tip hovering over a 2- μm -tall platinum structure (highlighted in light orange) inspired by the Louvre Pyramid. The structure was built from a mesh of 100 nm nanowires printed in the SEM with FEBID. The AFM probe serves as a sensitive force sensor for analyzing the mechanical properties of such nanostructures. (A. Alipour et al., *Microsc. Today* **31**(6), 17, 2023; image submitted by Stefano Spagna.)

—RJF

TO SUBMIT CANDIDATE IMAGES FOR **BACK SCATTER** VISIT <https://contact.physicstoday.org>.