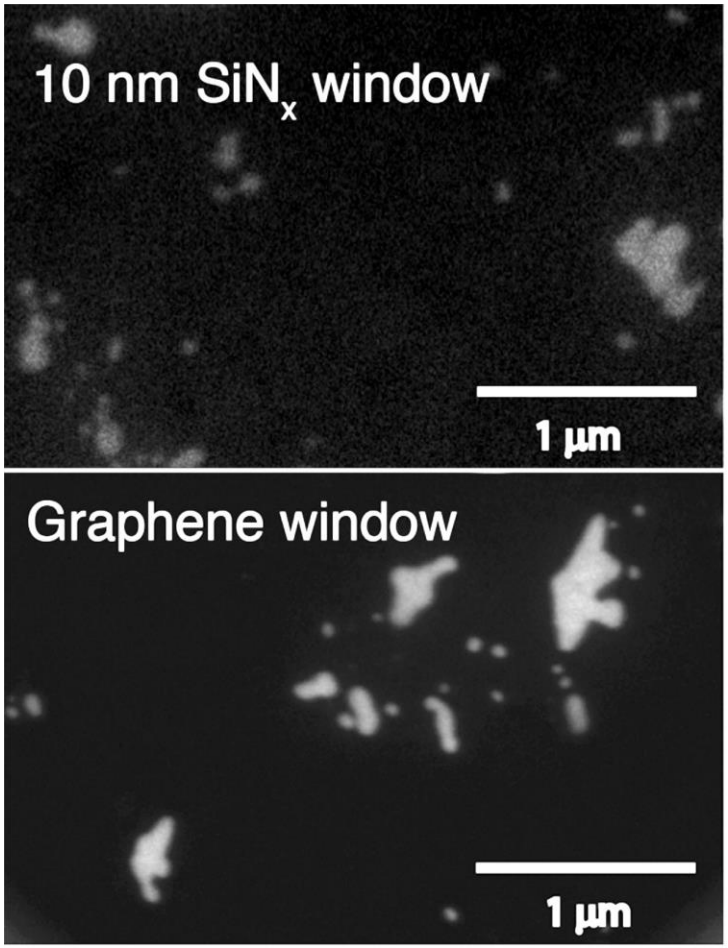
Better images through the world's thinnest window

Graphene windows make novel imaging even better

Scanning electron microscopes (SEMs) have much higher resolution than optical microscopes because they image with electrons instead of light. There is only one problem. Unlike light, electrons can't travel very far in air. As a result, most electron microscopes operate in a vacuum, which causes problems for fragile samples, such as living cells or tissues.

The next-generation air-SEM at Cornell avoids this problem using an ultra-thin, semi-transparent 'lens' that separates the vacuum-based microscope from the sample. Most of the electrons' journey is in vacuum, passing through the thin lens into air right before they hit the sample.

The original lens was a 10-nm-thick sheet of silicon nitride, but Cornell researchers wanted better images. What would happen, they wondered, if the original window could be replaced by one only a single-atom-thick? Preliminary images of gold nanoparticles, shown at right, show significant improvement. The images with the single-atom-thick lens are much sharper, displaying a factor of 3 improvement in signal-to-noise.



Supported by NSF DMR-1120296