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**Probing the Surface Guided Modes from Infrared to Ultraviolet by Fast Electrons**[1] AYCAN YURTSEVER, MARTIN COUILLARD, DAVID A. MULLER, Cornell University — We use monochromated, 200 kV electrons with high spatial resolution to study guided modes and surface plasmons in thin silicon slabs. We observe, both theoretically and experimentally, the presence of multiple plasmonic modes in a range from infrared to ultraviolet. We observe one mode at a thickness of ∼20 nm and up to five modes at a slab thickness of ∼250 nm, which agrees remarkably well with the relativistic dielectric theory. Finally, we use our technique to examine effective dielectric medium theories by studying silicon nanoparticles embedded in silicon oxide, a materials system with potential technological applications.

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