# Fabrication and Characterization of Nanoscale Light Sources in Diamond

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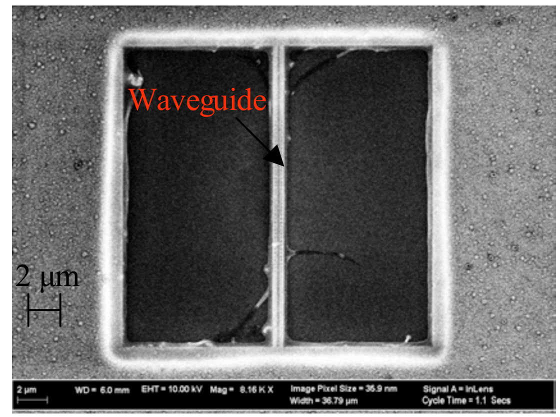
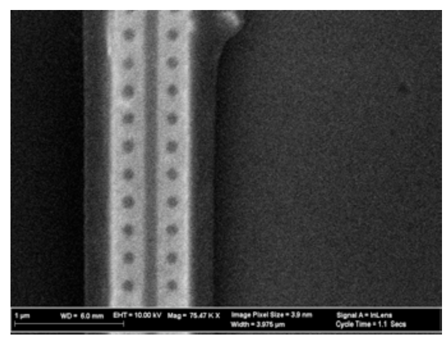
Imagine your computer operated using light instead of electricity. This scenario is actually not far from reality, as increasing amounts of information are processed and communicated optically. But in order for computers to use light, there must be devices. To this end, devices called “photonic crystals” are well-suited to trapping light, and then releasing it along well-defined optical pathways. Photonic crystals typically consist of a periodic lattice of air holes in a material, and have been made in silicon to control near-infrared light for applications in telecommunications. Now there is a drive to create photonic crystals for use in the visible spectrum, and for this, diamond’s transparency and high refractive index make it a promising medium. The crystals could then be used not only in areas such as optical information technology, but also in imaging and biosensing.

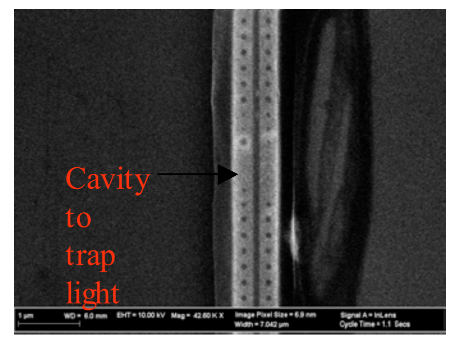
In this project, photonic crystal waveguides were made in diamond using a reactive oxygen gas to etch holes into the material.

*When red light travels through the waveguides shown, the defect traps the light, which can later be released.*

Right: A photonic crystal created in diamond. The entire crystal is only 20 microns long--about a quarter of the width of a human hair.






Above left: The photonic crystal waveguide. Above right: the defect centered in the waveguide where light is trapped.

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