Supersonic Chemical Deposition for Complete Filling of Extreme Aspect Ratio Templates

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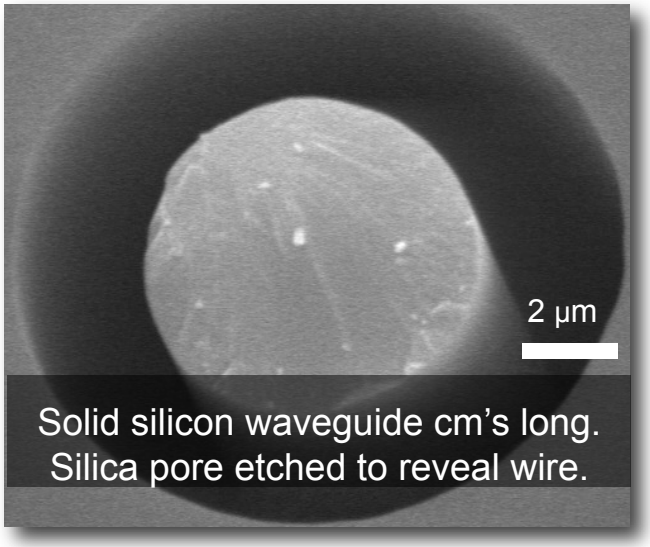

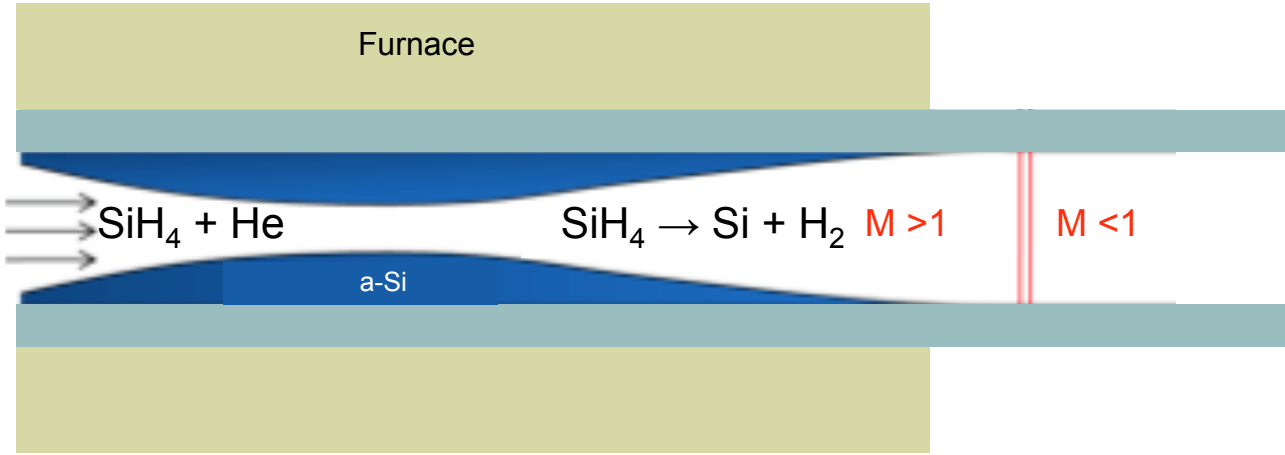

Semiconductor waveguides that can transport and manipulate light are critically important to the modern information superhighway and many other areas of science and technology. MRSEC researchers have filled the empty nanoscale or microscale pores in optical fibers to make semiconductor waveguides and optoelectronic devices.

During this high-pressure deposition, the growing semiconductor film forms a nano-nozzle that produces a supersonic jet with Mach number M greater than one, much like a conventional rocket engine. This supersonic jet allows for complete closure of the pore down to atomic dimensions. Pores can be filled void-free over many centimeters through this unique process.