Fabrication and Development of Diamond Photonic Cavities

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Project Type:	*Master thesis or Internship*	*Section:*	*MT, PH*
Official Start Date:	*Anytime*		

Submission of Final Report or Group Meeting Presentation at the end of the project

Project overview: Low photon extraction efficiency limits the optical spin readout fidelity in emerging quantum sensing technologies in diamond. Here, we propose and fabricate integrated diamond nanoprobes based on cavity-enhanced IR absorption of embedded NV centers. The design allows for near-unity readout fidelity, enables high spatial resolution and massively parallel detection schemes. Our fabrication technology enables the creation of suspended optical cavities from single-crystal bulk diamond and **the goal of this project** is to further establish a robust high yield fabrication protocol.

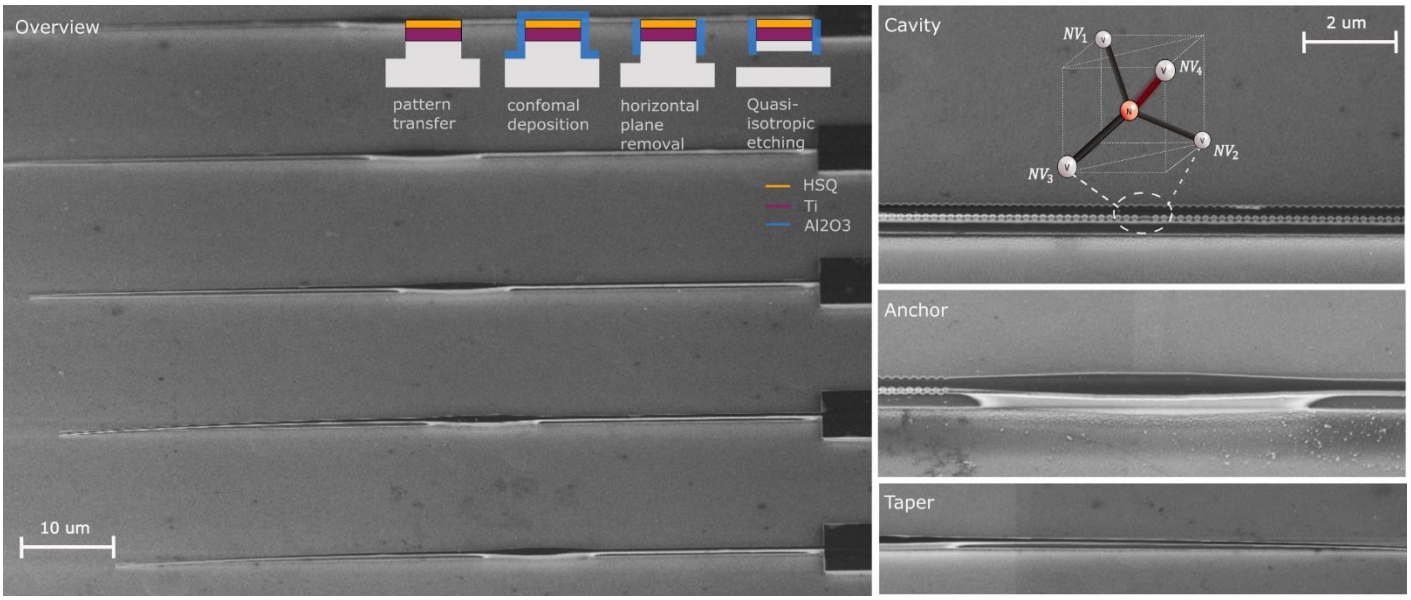

Figure 1. *Fabricated fully integrated suspended fiber-coupled diamond waveguide with a phase-shifted Bragg cavity for absorption-based quantum sensing applications and its corresponding zoom view.*

Preferred Qualifications:

- Background in cleanroom work and be familiar with lithography, reactive ion etching, and deposition processes is a plus.
- Passion for optimization of the process and quantum materials.

What the student will do: the student will learn how to develop and stabilize fabrication processes for optimal diamond quantum sensors.

- Development of new mask layer stack to increase the fabrication yield.
- Assisting undercut etching process of diamond and further inspection under SEM to identify functional units.