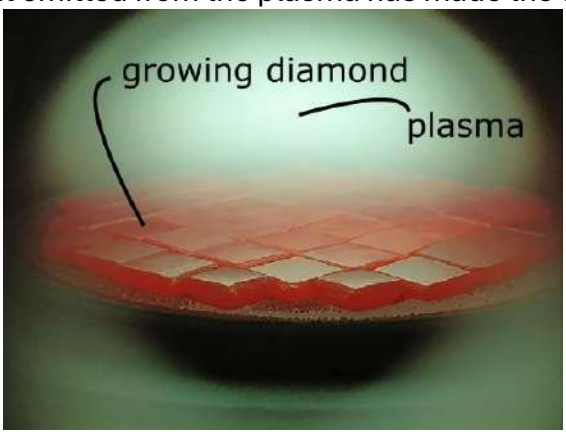
Unity Lab Grown Diamonds (ULGD), Surat - Gujarat, India | 2023-2024
Unity Lab Grown Diamonds (ULGD) is a startup company with approximately fifteen reactors in which ULGD grows diamond wafers for integration into semiconductor packages and for sale as gems. I served in ULGD's Instrumentation Group, which maintains and deploys sensors that monitor chemical and electrical activity within the reactors' inner deposition chambers.

Intern under Mr. Darshan Patel Chief Technical Officer,
From the Instrumentation Group, I monitored a new generation of deposition reactors. These reactors ignite a mixture of nitrogen, methane, hydrogen, and oxygen gases into a ball of plasma. Energy from the plasma causes molecules of methane to lose carbon atoms. Electrical fields in the plasma guide the free carbon atoms into a crystal lattice, creating diamond. FIG. 1, below, is a view inside a deposition chamber growing a batch of diamonds. Microwave energy has energized methane and hydrogen gas into a pale cloud of plasma. The extreme heat emitted from the plasma has made the diamonds glow red.



I studied the role of nitrogen in diamond deposition, learning that nitrogen accelerates diamond growth at the cost of introducing unwanted defects in the crystal. Too much nitrogen turns the crystal yellow. Without nitrogen however, growth decelerates, becoming inefficient and giving other types of defects an opportunity to appear. Two product lines were developed with different nitrogen concentrations, depending on the customer's intended application. Diamonds used in optics are slowly and carefully grown without nitrogen to avoid disturbing light transmission with discolorations and other defects. Gem diamonds can tolerate a higher concentration of nitrogen because nitrogen's yellow hue is undetectable to the human eye at moderate levels.

The ULGD internship introduced me to diamond synthesis and industrial sensors. I look forward to addressing similar challenges in optics and materials science as an engineering student.