High Temperature Electronic Devices Based on Wide Bandgap Thin Films

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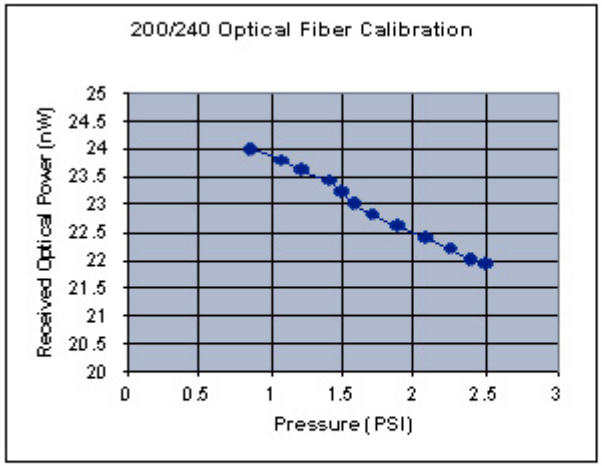
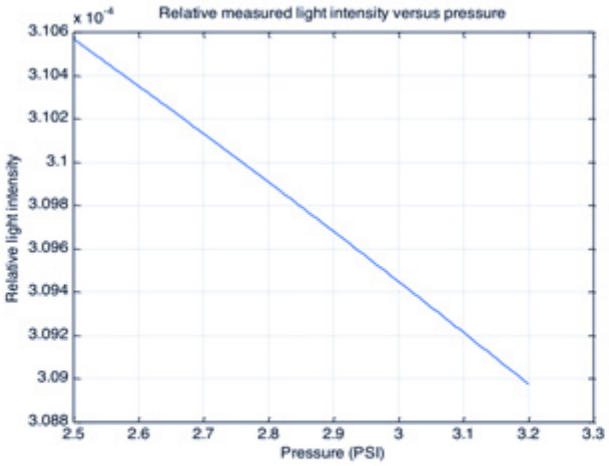
Intellectual Merit

Objective: High temperature electronics is an important area of research and education because of a need to monitor and control operations of many modern systems such as automobile and aircraft engines. The transformative scientific objectives of this research project are to: (1) synthesize diamond thin films suitable for fabricating devices useful at high temperatures, and (2) fabrication and characterization of devices made from diamond thin films.

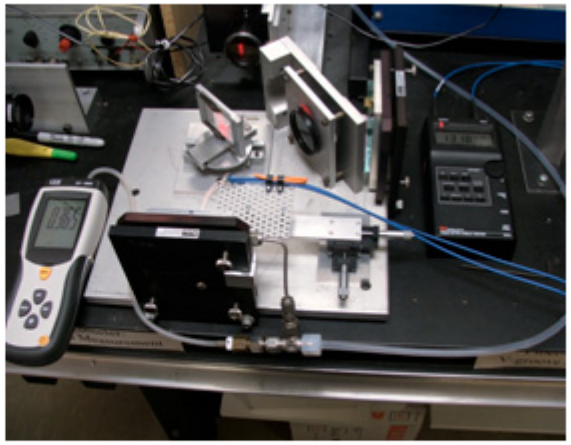
Results: Our research synthesized thin films of diamond on Si and etched to create a free-standing pressure sensor, which was further characterized. In addition, thin film diamond-based capacitor was fabricated and characterized for applications at elevated temperatures with properties approaching single crystal diamond. Both devices are potentially useful in electronics and MEMS (micro-electro-mechanical-systems) at high temperatures.



A



B



C

(A, B) Diamond-based pressure sensor responses and (C) Experimental setup used for the calibration of the probe.