

**Stony Brook University  
The Graduate School**

Doctoral Defense Announcement

**Abstract**

Electrospun Conducting Polymer Composites for Chemo-Resistive  
Environmental and Health Monitoring Applications

By

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Current sensor technologies consist of arrays of non-selective detectors leaving room for ambiguity and false alarms. There is a strong requirement for selective sensing elements that respond to target analytes such as NO<sub>2</sub> gas emissions which affect both the environment and public health. The requirements for developing a NO<sub>2</sub> sensor include high sensitivity to low gas concentrations (1-5ppm according to OSPA), high selectivity to NO<sub>2</sub> in the presence of other interfering gases, fast response and recovery times, and structural and chemical stability.

Intrinsically conducting polymers such as polyaniline can be molecularly and chemically manipulated to increase sensitivity, reduce the response and recovery times, and add specificity to target gases. This thesis explores nano-manufactured LEB-PANI nanocomposites using the electrospinning technique, using water vapor as a catalyst, and non-reactive support polymers to aid in gas adsorption and reactivity of the LEB-PANI. These new materials allow for room temperature selective NO<sub>2</sub> detection down to 0.5 ppm.

Also developed in this research is a customized in-situ UV-Visible spectroscopy technique employed in the analysis of the hybrid films to determine the optimum NO<sub>2</sub> sensor based on LEB-PANI. The focus of this thesis is to determine the mechanism which dominates the reactions between LEB-PANI, NO<sub>2</sub> and H<sub>2</sub>O using the aforementioned technique, coupled with FTIR and XPS to corroborate with acquired sensing data.

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