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Micro-Cantilever Sensitivity Optimization Through Material and Geometric Selection

Calorimetric Spectroscopy (CalSpec) is a chemical sensing technique that utilizes a micro-cantilever to detect low concentrations of analytes. Sensitivity of the technique is directly related to bending of a micro-cantilever. In this paper, bending of a Si_3N_4 micro-cantilever is modeled using a finite element software package and compared to experimental results from a CalSpec setup. The model compares the sensitivity of different bi-material cantilevers as well as different cantilever geometries. The bi-material triangular cantilevers are primarily Si_3N_4 having 320 x 70 x 0.6 µm geometry and are coated with approximately 40 nm of gold. A finite element model will be created and compared to experimental findings. Different coatings will be modeled and results given. Arrays of cantilever geometries varying length and width will be fabricated, tested, and compared to results in the model. Optimum characteristics will be tabulated and results given.