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Cantilever Arrays as a platform for chemical and biological sensors

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Since the late 1980's there have been spectacular developments in micro-mechanical or micro-electro-mechanical (MEMS) systems which have enabled exploration of new transduction modes that involve mechanical energy and are based primarily on mechanical phenomena. As a result, an innovative family of chemical and biological sensors has emerged. While MEMS represents a diverse family of designs, devices with simple cantilever configurations are especially attractive as transducers for chemical and biological sensors. In our presentation we deal with four important aspects of cantilever transducers: (i) operation principles and models, (ii) micro-fabrication, (iii) figures of merit, and (iv) applications of cantilever sensors. We also provide a brief analysis of historical predecessors of the modern cantilever sensors. Finally we have demonstrated that using large well designed arrays of differentially coated microcantilevers coupled artificial neural network techniques can provide information on the identity and amount of target chemicals. We will present our results and discuss future directions.