# A MICRO-CANTILEVER BASED PHOTOACOUSTIC DETECTOR OF TERAHERTZ RADIATION FOR CHEMICAL SENSING

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In this paper we describe a novel photoacoustic detector that can detect radiation in the Terahertz/sub-millimeter (THz/smm) spectral range, is immune to the effect of standing waves, and potentially can have spectral response that is independent of the absorption path length, thus offering crucial advantages for acquisition of THz/smm molecular spectra. The photoacoustic effect occurs when the energy from electromagnetic waves is absorbed by molecules and collisionally transferred into translational energy, thus resulting in local heating induced by the radiation. If radiation produced by the source is modulated, an acoustic wave results which can be detected by a pressure sensitive device such as a microphone or a cantilever. This transduction of the THz signal into a photoacoustic wave is what makes this approach insensitive to the detrimental standing waves associated with traditional THz sensors and allows for a significant reduction in the size of the absorption cell. A Microelectromechanical system (MEMS) cantilever pressure sensor was designed, modeled, fabricated, and tested for sensing the photoacoustic response of gases to THz/smm radiation. Here we present our manufacturing, experimental set-up and most recent spectroscopic results, which demonstrate the capabilities of this spectroscopic technique.