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In brief: whisper detection

Applied Physics Letters **80,** 4057–4059 (27 May 2002)

Silica microspheres with diameters of 40–400 micrometres are ideal for use as optical resonance cavities, and have potential applications ranging from high-performance Raman lasers to quantum optics. Now, these tiny glass spheres can add high-sensitivity biosensing to their repertoire. By coupling light from a tapered optical fibre into a silicon microsphere and measuring changes in resonance of its whispering gallery modes, the surface adsorption of a single monolayer of protein molecules can be detected.

Protein detection by optical shift of a resonant microcavity
F. VOLLMER, D. BRAUN, A. LIBCHABER, M. KHOSHSIMA, I. TERAOKA, AND S. ARNOLD
We present an optical biosensor with unprecedented sensitivity for detection of unlabeled molecules. Our device uses optical resonances in a dielectric microparticle (whispering gallery modes) as the physical transducing mechanism. The resonances are excited by evanescent coupling to an eroded optical fiber and detected as dips in the light intensity transmitted through the fiber at different wavelengths. Binding of proteins on the microparticle surface is measured from a shift in resonance wavelength. We demonstrate the sensitivity of our device by measuring adsorption of bovine serum albumin and we show its use as a biosensor by detecting streptavidin binding to biotin.
Applied Physics Letters **80,** 4057–4059 (27 May 2002)
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