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**Computational Study of Compact Microring Resonator Biosensors for Label-Free Detection**[1] BRETT WENNER, Air Force Research Laboratory, Sensors Directorate, JUSTIN WIRTH, Birck Nanotechnology Center, Purdue University, MONICA ALLEN, JEFFERY ALLEN, Air Force Research Laboratory, Munitions Directorate, MINGHAO QI, Birck Nanotechnology Center, Purdue University — High Q microcavities have been investigated for chemical/biological sensing due to their highly sensitive response to binding events. In this work, we design and simulate a feasible and near minimally sized microring resonator sensor with large enough sensitivity to detect a single cellular analyte. Sensor performance is evaluated by varying waveguide material and dimension, and light polarization and wavelength, to maximize the detectable resonant wavelength shift due to a single cellular analyte. 3D simulations using a finite-element based method show a 2.5 m radius sensor (approximately the length of one cell) produces a 125 pm wavelength shift, Q of 1150, and 6.4dB extinction ratio for a single bound cellular analyte, making the design promising for high sensitivity cellular sensing.

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