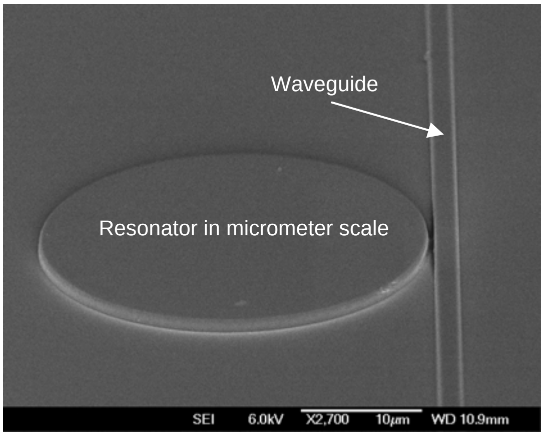
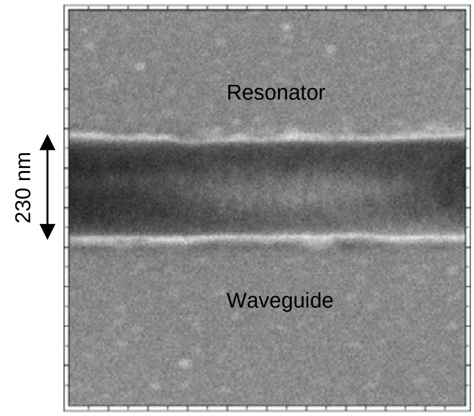
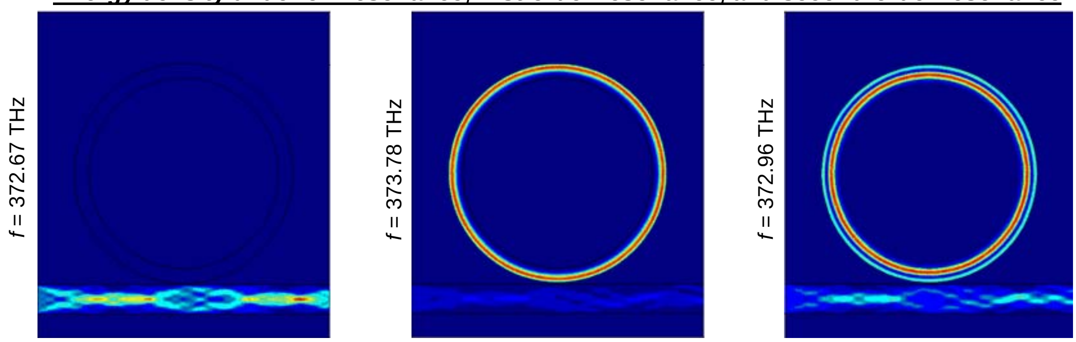
SEM image of fabricated WGM microcavity



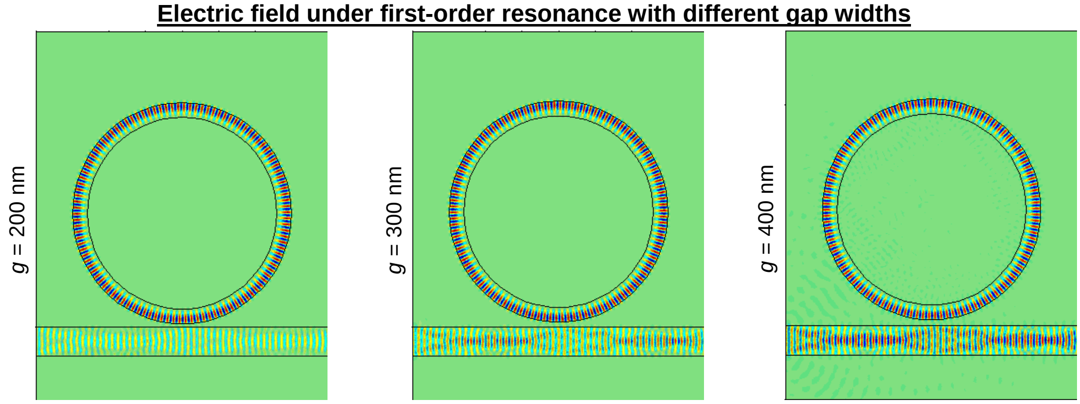
Miniature feature: nanostructured gap fabricated using 248 nm lithography



Energy density under off-resonance, first-order resonance, and second-order resonance



Electric field under first-order resonance with different gap widths



Optical Resonance in Fabricated Whispering-Gallery Mode Microcavity

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Whispering-gallery mode (WGM) optical resonance has attracted increasing attention due to its high potential for realization of microlasers, miniature biosensors, narrow filters, etc. An array of WGM miniature sensors has been fabricated using 248 nm optical lithography and conventional silicon IC processing. Photon tunneling was found between the waveguide and resonator. Under the first-order resonance, an extremely brilliant ring exists close to the peripheral surface of the resonator due to high energy storage. Two rings (with a brighter internal ring) are found under the second-order resonance. With the gap distance separating the waveguide and resonator decreases, the EM field in the waveguide becomes weaker and more energy is stored in the resonator. Since no WGM phenomenon occurs in the case of zero gap distance, an optimal gap may exist in the design of WGM microcavities.