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Microsphere whispering gallery optical resonators for biomedical microfluidic devices O. SVITELSKIY, A. DARAFSHEH, D. SUN, V.N. ASTRATOV, University of NC at Charlotte, M. SUMETSKY, OFS Laboratories, NJ 08873 USA, A. LUPU, M. TCHERNYCHEVA, Institut d'Electronique Fondamentale, Université Paris-Sud XI, 91405 Orsay, France — These resonators are potential candidates for broad application range as sensors of various physical quantities, and as key elements for photonic and optomechanical systems. Most of the biomedical applications involve deployment of resonators in fluidic environment. However, closeness of refractive indices of sphere n_s and fluid n_f obstructs excitation of the resonant modes. Moreover, an attempt to increase n_s can deteriorate coupling of light between fiber and sphere. To address these challenges we explore a series of high-Q resonators using a specially developed tapered optical microfiber microfluidic platform. The coupling strength between the cavity and the microfiber taper is shown to depend on the contact position of the microsphere along the taper and on the refractive index contrast between the microsphere and the fluid. We demonstrate that barium titanate glass beads with $n_s \sim 2$ can be suitable for practical tasks.

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