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Bacterial sensing using phage-functionalized whispering gallery microcavities HALA GHALI, Department of Engineering Physics, École Polytechnique de Montréal, HICHAM HIBLI, Biomedical Engineering Department, McGill University, PABLO BIANUCCI, Department of Engineering Physics, École Polytechnique de Montréal, JAY NADEAU, Biomedical Engineering Department, McGill University, YVES-ALAIN PETER, Department of Engineering Physics, École Polytechnique de Montréal — Whispering gallery optical microcavities are structures which can efficiently confine light at the micro scale. This confinement is based on total internal reflection of light at the interface between the cavity and the surrounding medium. Devices based on optical microcavities have a wide range of applications, such as microlasers, quantum optical devices and much more. In this work, we describe a biosensing application of these optical microcavities for the label-free detection of bacteria. In order for the sensor to be specific to a particular species of bacteria, we need to properly functionalize its surface so that only that kind of bacteria will produce a signal. The microcavity surface is first functionalized using PEGylated aminosilane. We then introduce phage-derived proteins that are specific to the bacteria we want to detect. The binding between the bacteria and the phage proteins creates a perturbation to the cavity field that leads to a thermo-optic effect. This effect is then observed as a shift in the resonance features of the transmission spectrum. We performed experimental measurements using a tapered fiber to couple the light from red laser (635 nm) into the resonator.

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