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Optical spectrum measurement of a cell-adhered microcavity for the cell-cycle analysis applications RYUSUKE SAITO, MITSUHIRO TERAKAWA, TAKASUMI TANABE, Department of Electronics and Electrical Engineering, Keio University — We build a setup and demonstrate successful measurement of the transmittance spectrum of a whispering gallery mode silica optical microcavity in which NIH 3T3 cells adhered on the top surface to achieve real-time and label-free measurement of the cell cycle. Label-free measurement is expected to prevent the cells to exhibit secondary effect. We build a system that enables the control of the gap distance between the microcavity and the tapered fiber, both of which are placed in the cell culture medium. The optimization of the tapered fiber diameter is the key to measure the spectrum of a microcavity in liquid. A swept wavelength laser light at a wavelength of 766 to 780 nm is used for the measurement. The cavity exhibit a Q of 1.0×10^6in air, where the value is 1.0×10^5 in the medium and drops to 3.1×10^4 after the cell-adhesion. Still the Q of the microcavity is sufficiently high to detect the change at the cavity surface. Indeed we observe slight spectrum shift toward a longer wavelength, which we believe is due to the adherence of NIH 3T3 cells on the silica microcavity. The successful measurement of the transmittance spectrum of a microcavity in cell culture medium is the first step to realize the analysis of the cell-cycle based on microcavity system.

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