

Freeform optics based lab-on-chip for combined Raman spectroscopy and fluorescence microscopy in biochemical analysis

**T. Chalyan, Q. Liu, W. Meulebroeck, H. Ottevaere
B-PHOT Brussels Photonics Team, Vrije Universitet Brussel, Belgium**

Abstract

For the last two decades, Raman spectroscopy has found widespread use in biological and medical applications thanks to the high specificity for the identification of molecules by means of the vibrational spectrum, which can be treated as its “fingerprint”. We aim to bring bulky Raman spectroscopy towards a lab-on-chip (LOC) system that integrates several laboratory functions on a single integrated chip in combination with a freeform segmented reflector. LOC Raman spectroscopy can provide highly specific information about molecules. The Raman spectrum of an unknown substance can be compared against a database of known Raman spectra to identify the substance under test. In this study lipid droplets in a microfluidic chip are monitored by using confocal Raman spectrometer based on the freeform segmented reflector. Moreover, possibilities to combine fluorescence microscopy and Raman spectroscopy will be discussed.