Mid-infrared lab-on-a-chip for protein sensing in real-time

Borislav Hinkov (profile/Borislav.Hinkov-149244), Florian Pilat (profile/Florian.Pilat-4356507), Laurin Lux (profile/Laurin.Lux-4361082), Patricia L. Souza, Andreas Schweighofer, Benedikt Schwarz, Hermann Detz, Aaron M. Andrews, Bettina Baumgartner (profile/Bettina.Baumgartner-4225361), Bernhard Landl, Gottfried Strasser (profile/Gottfried.Strasser-11977), Mauro David (profile/Mauro.David-4339384)

Author Affiliations

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Abstract

In this work we monolithically integrate a quantum cascade laser (QCL) and detector (QCD) addressing the same wavelengths \( \lambda = 1550-1650 \, \text{cm}^{-1} \) for liquid spectroscopy. QCL and QCD are combined using a 50-100 \( \mu \text{m} \)-long dielectric-loaded surface-plasmon-polariton (DLSSPP) waveguide, which typically guides \( \geq 90\% \) of the mode outside of the cavity. We show the analysis of the protein bovine serum albumin (BSA) and its denaturation process between 25°C-90°C in real time in a microfluidic cell (60 \( \mu \text{l} \)) for 20-60 mg/ml BSA-concentrations. To further test the sensor-robustness, we directly submerge it into a beaker and detect H2O up to 35%-40%, solved in isopropyl alcohol.

Conference Presentation

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