

Impedance Spectroscopic Measurements on Fluids in a Digital Microfluidic Platform

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Digital microfluidics combines the advantages of low consumption of reagents with a high flexibility of processing fluid samples automatically. For applications in life sciences not only the processing but also the characterization of fluid analytes is crucial. In this contribution a microfluidic platform combining the actuation principle of electro wetting on dielectrics for droplet manipulations and the sensor principle of impedance spectroscopy for the characterization of fluid composition and condition is presented.

The fabrication process of the microfluidic platform comprises physical vapor deposition and structuring of the metal electrodes onto a substrate, the deposition of a dielectric isolator and a hydrophobic top coating.

The key advantage of this microfluidic chip is the common electric nature of the sensor and the actuation principle, so no additional sensor integration is necessary. Multiple measurements on fluids of different composition (including rigid particles and biologic cells) and of different conditions (temperature, sedimentation) were performed as well as online monitoring of in process parameters changing over time. These sample applications demonstrate the versatile applications of this combined technology.