

Lab on Chip

Micro fluidic platform for the separation of abundant proteins and specific sample dosage

Definition of Task: In this bachelor thesis, in cooperation with RICB AG, a pre-study of a point of care device for the analysis of human whole blood samples is presented. The aim was to remove proteins from blood plasma, which could negatively influence the analysis on a BIO-FET sensor.

Approach / Technology: For this purpose, a theoretical concept, which can autonomously carry out all the necessary steps for plasma preparation with the help of the electrowetting technique, is presented. For the extraction of abundant proteins, primarily albumin, magnetic nanobeads are used, which are functionalised for the binding of albumin. The required functions for the device are droplet transport, mixing of droplets and extraction of the beads from the plasma. The droplet manipulation is based on the principle of closed EWOD (electrowetting on dielectric). In addition to the development of a theoretical concept, different, partly novel layer systems were analysed, which can be used for the construction of an EWOD device.

Result: The best combination turned out to be silicon nitride as an insulator and a PTFE-like passivation layer as a hydrophobic layer. The silicon nitride could be produced pinhole-free. In a next step, thanks to the high dielectric strength, the layer could be made very thin. The PTFE-like passivation layer was particularly distinguished by its production with standard microtechnical processes, a high contact angle, reversible droplet actuation and the possibility of using thin layers. However, this hydrophobic layer must be optimised in subsequent work so that EWOD can indeed be

implemented on the new layer system.

Graduate



Chantal Stolz



Johannes Fehr

Advisor

Prof. Dr. Rudolf Buser

Co-Examiner

Prof. Dr. Jens Ulmer

Subject Area

Microtechnology

Project Partner

RICB AG

Set-up for droplet manipulation using open EWOD

Own presentation

