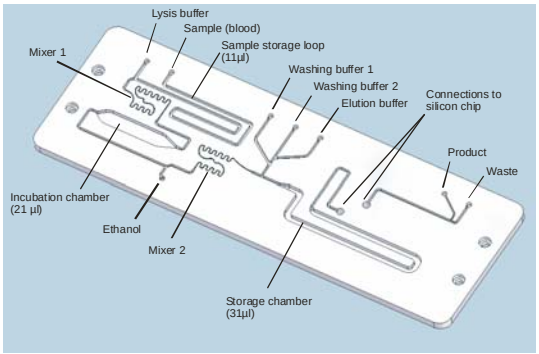
DNA extraction from whole blood

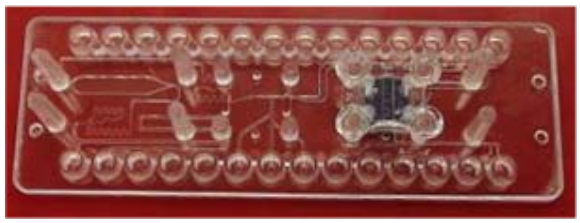
A DNA based analysis of a patient sample is based on a protocol with many operations: sample collection, cell concentration, DNA purification, DNA amplification, and finally detection. The ThinXXS microfluidic construction kit allows for modularization of these operations, so that e.g. DNA purification can be performed in one slide, while amplification is performed in the next.
The microBUILDER consortium fabricated and tested a polymer slide module for DNA extraction from whole blood samples.
The efficiency compared to a commercially available standard DNA extraction kit (Qiagen) was about 10% without any optimization or design iterations. The overall potential for further optimization and improvement was identified and could be tested and implemented in further development steps and design iterations.

The partners involved were

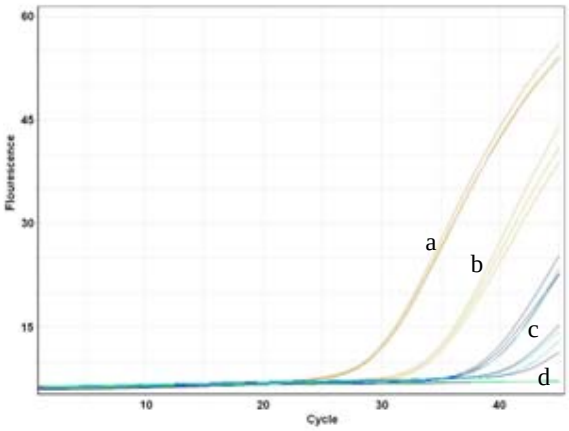
- HSG-IMIT: design and characterization
- Tronics: manufacturing of silicon chip using the microBUILDER DRIE process
- thinXXS: manufacturing of silicon integration slide, microfluidic interconnections and fluidic management



Design of the polymer module



Polymer module with integrated silicon chip with silicon dioxide pillars



Results of qRT-PCR of extracted DNA. Intensity fluorescence vs. number of PCR cycles. a), b): reference extractions using Qiagen Kit (a = 200 µL, b = 10 µL blood), c): extractions using the polymer / silicon module (10 µL blood), d): negative control

The slide with fluidic connections for sample insertion, lysis buffer and wash buffers.

www.microBUILDER.org

Contributing partners