ATR-FTIR Microplate Reader and Micromachined ATR Silicon Crystals

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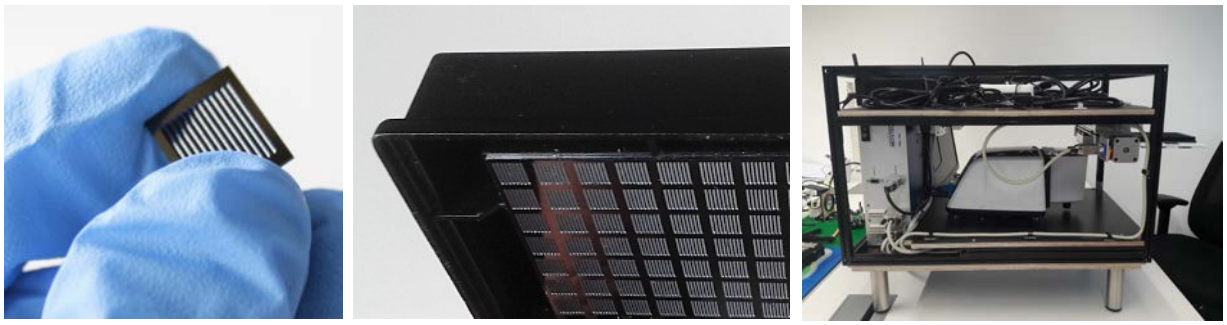
The analysis of blood samples by Fourier Transform Infrared (FTIR) Spectroscopy to detect diseases like cancer[1,2] or malaria[3]are an upcoming topic in the last decades. There are ongoing efforts to transfer infrared spectroscopy from research into clinics. Therefore, large databases for machine learning and calibration algorithms are needed. An automated ATR high-throughput device was developed to enable larger studies.



Left:Silicon ATR crystal with v-grooves on the bottom side. Middle: Bottom side of the microplate. Right: Prototype of ATR high-throughput device.

Cost-effective silicon ATR crystals introduced by Schumacher et. al[4] where optimized for the integration into microplates and higher signal intensity. The fabrication makes use of proven processes of the semiconductor industry and leads to crystals which are up 50–100 times cheaper compared to conventional ATR crystals. The very short light path of just 1 mm gives access to the full spectral range of standard FTIR spectrometers, which also covers the fingerprint region. Spectra recorded with these silicon crystals are comparable to those of conventional single reflection elements.

References

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