

## Microfluidics & Miniaturization - the Teenage Years are Over...

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After a brief overview of historic micro- and nanotechnology for "lab on chip" devices, I will focus on 2 examples of near market applications: Bacteria causing infections can be identified by detecting specific DNA sequences. This method is widely used and has a high degree of specificity. However, for this purpose, the micro organisms will have to be captured, and it is not clear whether they are dead or alive. Metabolite studies have the advantage that remote evidence for live cells can be identified.

I will present portable equipment for volatile metabolite quantification, based on multi-capillary GC and ion-mobility detection [1]. The raw data is mathematically treated to receive best discrimination of patient groups. Applications for diagnostics of lung infections and lung cancer will be shown. In addition, a chip-based hand held real-time PCR instrument will be presented. A "virtual reactor" approach, i.e., a free droplet in oil, is used for thermal cycling and subsequent melting temperature profiling of the PCR product [2].

### References

[1] Perl, T., Vautz, W., Nolte, J., Baumbach, J.I. & Quintel, M. Ion mobility spectrometry of human pathologic bacteria - metabolic profiling by volatile organic compounds. *Infection* 37, 24-24 (2009).

[2] Pavel Neuzil, Chunyan Zhang, Juergen Pipper, Sharon Oh, Lang Zhuo, Ultra fast miniaturized real-time PCR: 40 cycles in less than six minutes. *Nucleic Acids Research*, 2006, Vol. 34, doi:10.1093/nar/gkl416