Biomolecule separation at the nanoscale on the cover of Analytical Chemistry

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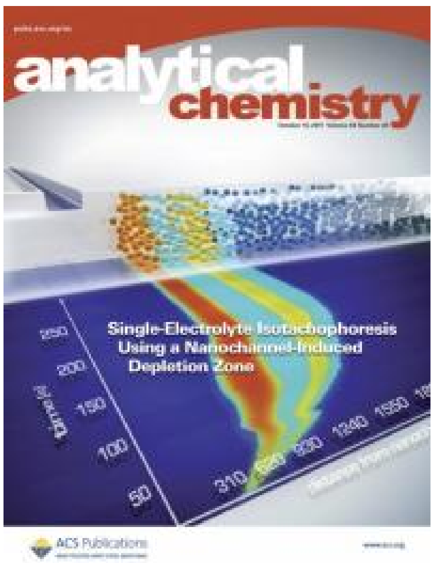

A combination of nanofluidic and electric phenomena has enabled researchers from the Leiden/Amsterdam Centre for Drug Research and the Netherlands Metabolomics Centre to create one of the world's smallest separation techniques. This was published last week as a cover issue in Analytical Chemistry. The separation technique may find many applications in the healthcare of the future.

Separation

Researchers used a nanofluidic channel to pump ions away from a liquid, forming locally an ion-depleted zone. At the border of this depletion zone, biological components were separated. “This is possible because ions traveling in an electric field change direction on either side of the border. We call this ‘depletion zone isotachophoresis'", explain the authors, Jos Quist and Kjeld Janssen. "You can best imagine the depletion zone as a traffic light; once the sign is red, cars will stop, the fastest cars in the front and the slowest in the back. In our case the cars are the molecules that we want to separate."

Chip

"The chip has the size of a fingertip", explains Dr. Heiko van der Linden. "The nano- and microfluidic channels are made in glass here at the faculty. Our challenge was to create channels as thin as 50 nm. A simple hair, for example, has a typical thickness of around 100 micrometers. You have to slice that hair in 2000 slices to get a thickness of 50 nm. This is not easy to do, but fortunately we had an excellent collaboration with the group of Prof. Aarts, who has extreme precision machinery that enabled us to do this."

Metabolomics

Prof. Hankemeier sees great potential for this technology. You can build it into handheld devices, such that you can measure one’s body parameters on the spot. This spot can be the bedside or the ambulance, but also the living room. This technology enables analysis of metabolic markers in hundreds of samples in parallel. “That is where we want to go”, says Hankemeier, “we want to measure the human metabolome, extremely fast and at low cost. We can then monitor at every moment in time the health status of a person. This will have great implications for disease prevention and personalized medicine.”

More information: See the full cover: pubs.acs.org/action/showLargeC … ver?issue=361381184&
Read the article: dx.doi.org/10.1021/ac2018348

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