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Centrifugal Microfluidic Platform Using Supported Liquid Membrane Extraction for Combined Sample Clean-Up and Enrichment of Trace Analytes

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Poster Title	Centrifugal Microfluidic Platform Using Supported Liquid Membrane Extraction for Combined Sample Clean-Up and Enrichment of Trace Analytes
Abstract (300 words approx.)	<p>In this poster we present a pump-less microfluidic platform which performs sample clean-up and enrichment in a single step, by integrating Supported Liquid Membrane (SLM) extraction [J. Å. Jönsson and L. Mathiasson, <i>J. Sep. Sci.</i>, 2001, 24, 497–507]. Our platform offers a simple, yet very efficient, method for achieving sample pre-treatment and enrichment of trace analytes in an easy to use and highly efficient device.</p> <p>The proof-of-principle experiments presented here showcase the effectiveness and robustness of this method by extracting and enriching theophylline from tea samples. Theophylline is also a common drug used in treatment of asthma and other lung conditions, and is therefore found as a trace analyte in blood samples from such patients.</p> <p>The sample clean-up and enrichment is achieved in a single extraction step, by simply passing a donor liquid (in this case 1 mL of tea, adjusted to pH 2.5 with sulphuric acid) slowly on top of the acceptor solution (30 µL of ammonium buffer, pH 10.3), separated by an oil soaked nanoporous polymer membrane, the SLM. This sandwich structure can be seen as a two times (or double) liquid-liquid extraction (LLE), taking place simultaneously: A normal LLE extraction of analytes from the donor phase to the organic phase immobilized in the membrane, followed by back extraction into the acceptor solution. Once in the basic acceptor phase the target analyte, a weak acid ($pK_a \sim 8$), is charged. Since charged molecules are practically insoluble in the organic phase, the theophylline cannot diffuse back into the donor phase and the concentration gradient is unaffected. In this way both sample clean up and high enrichment (~24 times original concentration) can be obtained.</p> <p>SLM extraction is a fairly well established technique in analytical chemistry for extracting and enriching trace analytes from complex matrices, such as for instance saliva or surface water. However, the work presented here is, to the best of our knowledge, the first example of integrating SLM extraction with centrifugal microfluidics, with the obvious benefits of automation and parallelization of the otherwise time consuming extraction process, as well as being easy to operate.</p>

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