

Low-Cost Analytical Devices Made from Porous Substrates: Simple is the Best

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Abstract

In the context of ageing societies and general population increase, there is a continuously growing demand for point-of-care (POC) clinical diagnostic tools. The development of assay systems suitable for use by untrained end users is lacking behind. Our group has been focusing on the development of assay devices where required user interaction is limited to the application of the sample and where assay results can be ideally read out by naked eye or by means of a simple colorimetric approach. Porous materials such as cellulosic filter paper and thread serve as the substrates upon which to build an assay. All required reagents are pre-deposited and sample and reagent transport is driven by capillary forces with no need for external pumping. In many cases, conventional drop-on-demand inkjet printing serves as a versatile tool for the precise controlled deposition of assay materials. Examples presented in this seminar include the colorimetric bioluminescence-based detection of antibodies in whole blood, a competitive lateral flow assay for the semiquantitative direct naked eye readout of an urinary oxidative stress marker, as well as the naked eye evaluation of the urinary albumin index for the early detection of renal disease, among others.

Biography

Dr. Citterio received a master's degree in chemistry from the Swiss Federal Institute of Technology in Zurich, Switzerland (ETHZ) in 1992. He then remained at ETHZ to obtain his PhD in Analytical Chemistry under the guidance of Profs. Gerd Folkers and Ursula Spichiger in 1998. He moved to Keio University in Japan as a Japan Society for the Promotion of Science (JSPS) postdoctoral fellow, where he worked on the design of functional organic dyes for chemical sensing in the group of Prof. Koji Suzuki until 2002.

After appointments as senior researcher at ETHZ and working for Ciba Specialty Chemicals Inc., Dr. Citterio moved back to Keio University in 2006, where he was appointed as a tenured associate professor in 2009 and promoted to professor in 2014. Since 2017, he is leading the Analytical Chemistry research group. His research focuses on the development of simple, low cost analytical tools for diagnostic and environmental applications.