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Understanding ionic liquids in microfluidic papers - towards the design of paper-based electrochemical sensors

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Global pollution of heavy metals poses severe threat to ecological systems and causes a great challenge for the global sustainability. For monitoring and detecting the heavy metal ions in the environment a portable point-of-care sensing platform is urgently required.

In this project we investigate a paper sensor based on ionic liquid (IL) for direct electrochemical detection of heavy metal ions. The ionic liquids allow a larger electrochemical window. This ionic liquid based electrochemical sensor should demonstrate a high sensitivity and selectivity towards the online monitoring of these metal ions, along with short detection time and high accuracy. However, the use of IL's in such microfluidic papers raises a lot of open scientific questions in relation to behavior of IL's in regard to influencing fluid dynamics in the porous paper structure within a microfluidic channel. Also, we investigate promoting or limiting properties of different IL's for electrochemical detection of heavy-metal ions.

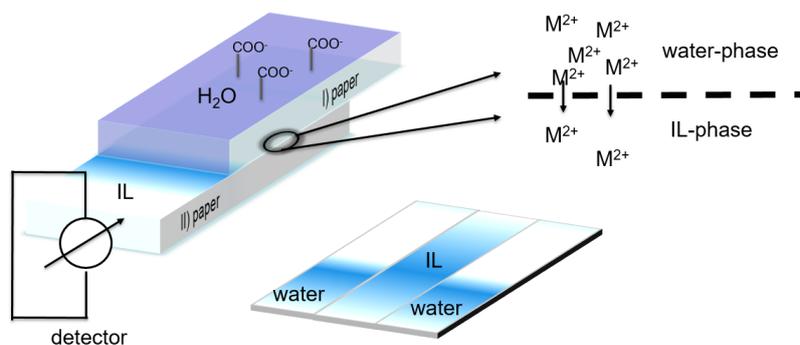


Fig.1: Schematic description of paper-based 3D sensor.



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CELLULOSE-BASED MATERIALS –
FROM SCIENCE TO TECHNOLOGY

References

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Biography

Tizian Venter was born on January 10, 1992 in Groß-Gerau. He started his bachelor's degree in chemistry at TU Darmstadt in 2012. He completed his bachelor thesis with the topic "Investigations on the capillary transport of water in structured papers" in the working group of Prof. M. Biesalski. The master thesis deals with the topic "Spiropyran-functional paper influence of light-induced isomerization on the capillary imbibition of water". He has been a PhD student at TU Darmstadt with Prof. Markus Biesalski since June 2020. In his PhD he will investigate the functionalization of papers that are used for analytical investigations.