All Polymer Lab-on-a-chip System for Virus Detection in Water

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Poster Title	All Polymer Lab-on-a-chip System for Virus Detection in Water
Abstract (300 words approx.)	Viral contamination in waters intended for human consumption or human contact poses a high health risk and can, in worst-case, lead to viral outbreaks. The waterborne norovirus is a major cause of viral gastroenteritis [1]. Conventional detection methods of norovirus and other enteric viruses rely on microbiological methods like polymerase chain reaction and a variety of sample preparations [2][3]. These methods are time consuming, expensive and require highly trained personnel. Thus, viral surveillance cannot be done continuously and only provide an instant overview of the water quality. In the project we are targeting three viruses: norovirus, rotavirus, and hepatitis A virus. These three viruses are responsible for the highest occurrence of water-borne viral gastroenteritis and hepatitis in humans. We are developing a cost effective detection system for online virus surveillance of water bodies. The detection is based on differential impedance measurements between a reference electrode and an electrode functionalized with a bio-recognition element. The bio-recognition element is an aptamer specific to the target virus. We have previously shown very low detection limits with influenza virus as proof of concept of the technology [4]. The electrode material is the intrinsic conducting polymer PEDOT:PSS screen-printed on TOPAS for easy up scaling of production. Here we present the fabrication and design of our virus sensor as well as initial results. We also propose a detection scheme with turnover times as low as a few hours, which proves a tremendous advantage over current methods. [1] Teunis, P. F. M et al., (2008). Journal of Medical Virology, 80(8), 1468-76 [2] Faccin-Galhardi, Lopes, et al., (2013) Virus Rev & Res 18(1-2), online edition. [3] Wyn-Jones, A. P et al., (2011). Water Research, 45(3), 1025-38 [4] Kiilerich-Pedersen et al., (2013) Biosensors and Bioelectronics, 49, 374-79

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