



Low-cost fabrics as a high-tech material for printed sensors and actuators

by

Firat Güder

Department of Bioengineering
Imperial College London

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Abstract: Woven and non-woven fabrics such as cellulose paper and textiles, are low-cost, flexible, porous and generally biodegradable materials that are ideally suited for the fabrication of disposable sensors and actuators. Unlike microfabricated (e.g., PDMS-based) microfluidic systems, printed microfluidics produced using fabrics do not require pumps and other complex components, allowing construction of highly compact, miniaturized devices for rapid, multiplex sensing of various bioanalytes (such as DNA) in the field. The intrinsic properties of cellulose fabrics (cellulose is a highly hydrophilic biopolymer) also enable measuring gaseous analytes in a completely new way. This new method of sensing gases allows monitoring respiratory activity in humans and detecting volatiles formed by the degradation of food to measure food freshness. Regardless of the application, devices produced using fabrics only require a series of simple methods of fabrication without the need for specialized facilities such as a cleanroom. In this talk, I will present our latest work on sensors and actuators created using fabrics and how they can enable new classes of low-cost technologies.

Biography: Dr Firat Güder is an assistant professor in the Department of Bioengineering at Imperial College London. Prior to his appointment at Imperial, he was a research fellow in the group of Prof. George M. Whitesides at Harvard University in the Department of Chemistry and Chemical Biology. He has a PhD in Microsystems Engineering (summa cum laude) from the University of Freiburg, Germany, and a BSc in Computer Engineering (First Division) from the University of New Brunswick (UNB), Canada. Over the years, his achievements have been recognized through numerous awards such as the UNB Class of 1939 Scholarship, N. Myles Brown Scholarship, Governor Thomas Carleton Scholarship, KU Leuven International Scholarship, Furtwangen University MTM Scholarship, German Research Foundation International Research Fellowship, Tom West Analytical Fellowship and most recently 2018 UNB Young Alumni Achievement Award. Firat and his team work in the interface of material science, electronics, chemistry and biology. His group focuses on the development of new materials, fabrication of low-cost sensors/actuators with the eventual aim of transforming the devices developed into fully functional portable systems for use in healthcare, agricultural and food sciences. In addition to his peer-reviewed papers, he is an inventor of multiple patents, five of which have been licensed to commercial companies. His research at Imperial is sponsored by the Wellcome Trust, EPSRC, BBSRC, GE Healthcare, The Royal Society, Analytical Chemistry Trust Fund, AWE and others. For more information on Firat and his research activities, please visit his website at www.guderresearch.com.

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