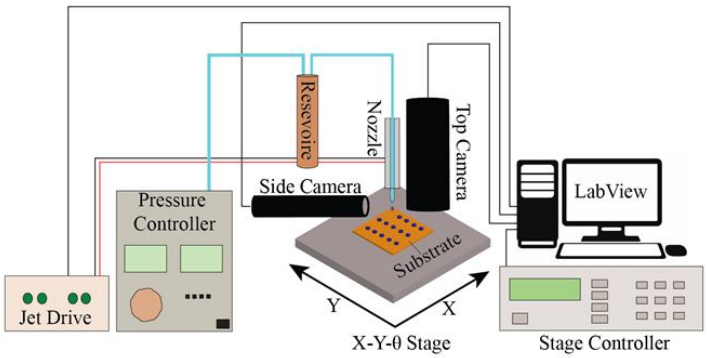
Project updated: 01.06.2018

Inkjet printing functional inks for gas sensing applications

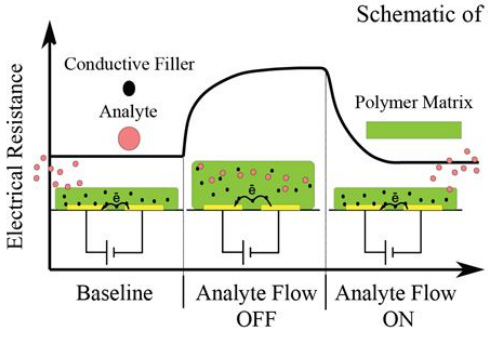
Semester Project

(Section: microengineering, material science)

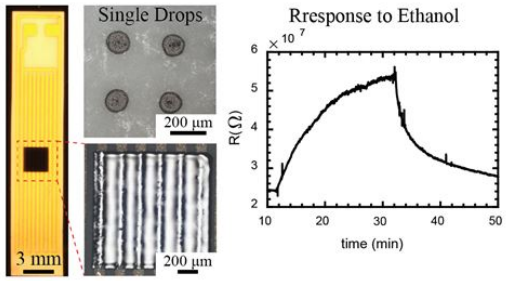
Additive manufacturing has gained a lot of interest in the recent years due to the possibility of fabricating complex structures directly, without the need for any intermediate steps. As a type of additive manufacturing, inkjet printing (IJP) is considered a cost-effective and flexible technique for deposition of functional materials. In its simplest form, IJP gives the possibility of positioning very small volumes of fluids (in picoliters range) precisely on the substrate. The main advantage of this technique is that it enables us to fabricate patterns locally and directly without contacting the substrate. In this project, we are investigating IJP of functional materials with applications in chemiresistive gas sensors. Our aim is to formulate polymer nanocomposites in the form of inkjet-printable inks, capable of sensing different analytes. In order to acquire the desired functionality the physical properties of the ink e.g., viscosity, surface tension, etc. have to be tailored, printing parameters have to be optimized and sensing behavior of the printed sensors has to be studied. During this project, students have the opportunity for a hands-on experiment with the inkjet printer and will learn how this relatively simple technique can be used for fabrication of microstructure devices.



Schematic of the inkjet pritner setup



Working principle of chemiresistive gas sensors based on polymer nanocomposite



An example of the printed sensor and its response to ethanol

École polytechnique fédérale de Lausanne

Microsystems Laboratory 1
(Prof. J. Brugger)

EPFL STI IMT LMIS1
(Batiment BM)
Station 17
CH - 1015 Lausanne

Phone : +41 21 693 49 81
E-mail : shao-chi.yu@epfl.ch
Office : BM 3.114

Project updated: 01.06.2018

Work description:

- Material characterization
- Formulating polymer nanocomposites
- Hands-on with the inkjet printer
- Characterization of printed sensors

Contact: Mohammad Mahdi Kiaee *(m.kiaee@epfl.ch)*

École polytechnique fédérale de Lausanne

Microsystems Laboratory 1
(Prof. J. Brugger)

EPFL STI IMT LMIS1
(Batiment BM)
Station 17
CH - 1015 Lausanne

Phone : +41 21 693 41 77
E-mail : m.kiaee@epfl.ch
Office : BM 3.110