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PRESS RELEASE
November 16, 2017

Towards an integrated Point-of-Care diagnostic device

October 6, 2017, David Gosselin defended his doctoral thesis at University Grenoble Alpes prepared under the supervision of the Professors Didier Chaussy and Naceur Belgacem (Grenoble INP-Pagora / LGP2) and the co-supervision of Jean Berthier, Research Engineer (CEA, Grenoble). He presented the results of his research work entitled ***Towards an integrated Point-of-Care diagnostic device: use of capillarity as well as thermoforming and screen printing processes*.**

Developments of microfluidics (the study of flows at the sub-millimetric dimensions) have made possible the integration of most of the macroscopic functions of laboratory fluidic systems in a miniaturized system, thus realizing a lab on a chip. This allows the conception of low cost, sensitive and efficient medical diagnostic device usable outside of a medical infrastructure. Such devices are called Point-of-Care systems. The design and fabrication of such devices requires an elaborated and coherent integration that takes into account all the constraints imposed by the targeted final application.

The work reported here, and performed during the PhD internship, is focused on the study of the concept and development of the integration of a PoC device based on the isothermal LAMP (Loop mediated AMPlification) reaction for the molecular analysis of DNA. In order to offer a cheap and easily industrialized system, we investigate the use of paper as the chip material and thermoforming as the mean to build the channels. These two techniques are currently used in the industry and their adaptation to the fabrication of such devices is easy and low-cost.

In order to perform a LAMP reaction, specific functions such as a heating and a detection system are required. The integration of these functions was carried out using screen printing

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technology. Heating is done by Joule effect using a layer of carbon-based conductive ink. Detection is performed by a potentiometric method, using polyaniline-covered electrodes. It is shown that this approach is compatible with integration when the screen-printing layers are superposed. Besides they can be printed before thermoforming, resulting in a highly integrated system.

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