Building Smarter Microfluidic Devices with Functional Materials

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Abstract

Nowadays, microfluidic technology is one of the most expanding fields of research, having its mayor contribution in the life science and biotechnology sectors trough the development of point-of-care diagnostics tools and analytical devices for environmental monitoring, food and chemical analysis.[1]

The integration of chemical and/or biosensors in the microchannels of microfluidic devices using smart materials has several technological advantages compared to bench based sensor devices, such as reduction of the volume that is needed to monitor certain analytes, minimisation of cross-contamination from the surrounding environment and continuous flow operation, among others, Fig. 1a.[2] Moreover, the incorporation of stimuli responsive materials in microfluidics is enabling new ways of fluidic control and manipulation that overpasses existing technology, opening new avenues for the commercialisation of these devices (Fig. 1b).[3]

In this contribution we present the latest advances carried out at CIC microGUNE on the integration of smart materials in microfluidic chips, in order to provide new functionalities to microfluidic platforms.

References

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[2] L. Florea, C. Fay, E. Lahiff, T. Phelan, N. E. O'Connor, B. Corcoran, D. Diamond, F. Benito-Lopez, Lab Chip, *13* (2013) 1079.
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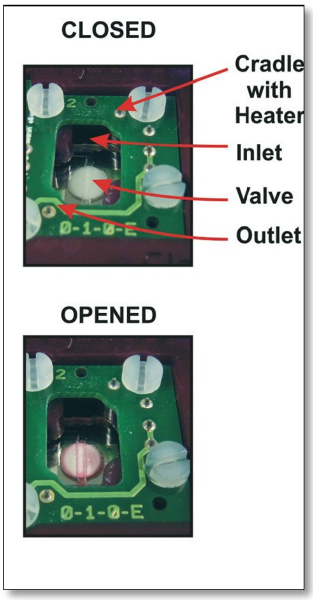
Figures

(a)



(b)

Figure 1: (a) Pictures of polyaniline functionalised PDMS chips, acidic on the top and basic on the bottom, as pH sensor. **(b)** Picture of an ionogel microvalve (7 μL) inserted in the holder with integrated heaters at the bottom for fluid control.