ATWARM

Advanced Technologies for Water Resource Management

Next Generation Autonomous Analytical Platforms for Remote Environmental Monitoring

Generation of Fully Functioning Biomimetic Analytical Platforms for Water Quality

M. Czugala, F. Benito-Lopez and D. Diamond

CLARITY: Centre for Sensor Web Technologies, National Centre for Sensor Research, Dublin City University, Dublin 9, IRELAND

Valve Actuation in micro-fluidics

- MAGNETIC NANOPARTICLES IN IONOGELS
- VISIBLE LIGHT (PHOTO-ACTUATED IONOGELS)

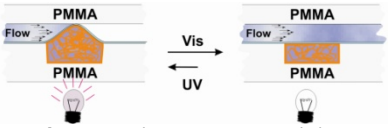


Figure 1. Valve actuation using light.

Microfabrication

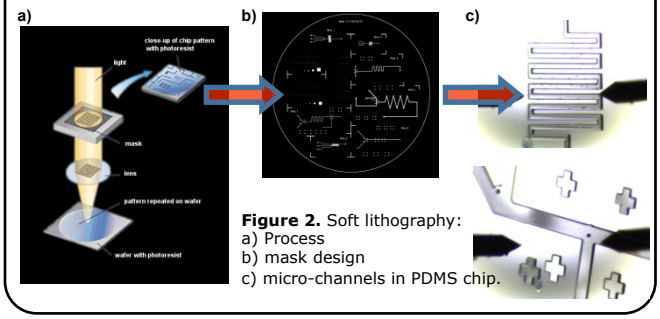


Figure 2. Soft lithography:
a) Process
b) mask design
c) micro-channels in PDMS chip.

Surface Activation

SURFACE FUNCTIONALIZATION:

1- O_2 plasma treatment of glass substrate,
2- dipping in water solution of silane agent,
3- Photo-polymerisation of the ionogels using a mask.

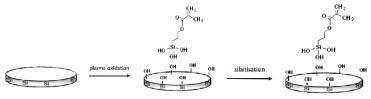


Figure 3. Silanisation process.

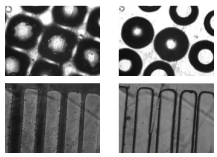


Figure 4. Ionogel actuation during photo irradiation.[1]

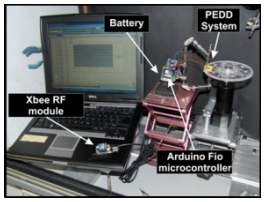
[1] B. Candice A Two-Chromophore photolithography photopolymerization, IPM Fraunhofer, 2010

Collaborations

- **Biomedical Diagnostics Institute, DCU, (Ireland)**
- **Fraunhofer-IPM, Freiburg, (Germany)**
- **Instituto de Microelectonica de Barcelona, UB, (Spain)**

Wireless Paired Emitter Diode Device

A NOVEL OPTICAL SENSOR FOR LAB-ON-A-DISC APPLICATIONS IN WATER MANAGEMENT



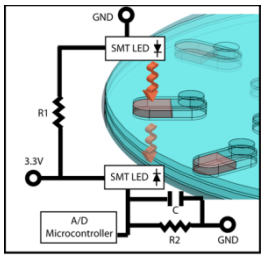


Figure 5. Prototype configuration of the PEDD system with schematic of circuit used in the system.

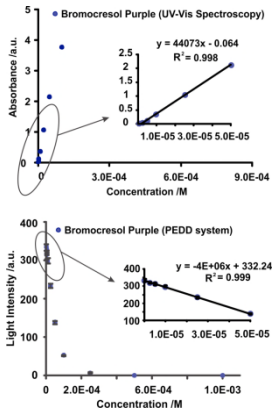


Figure 6: Calibration curves of bromocresol purple pH dye, using a UV-Vis spectrometer (upper side) and the PEDD system (bottom side), $L_{UV\text{-}Vis}$=1 cm, L_{PEDD}= 0.16 cm, n = 4.

Conferences

• M. Czugala, R. Gorkin, C. Rovira-Borras, J. Ducree, D. Diamond, F. Benito-Lopez, "***Microfluidic system with a wireless paired detector diode device as an optical sensor for water quality monitoring"***, Conference on Analytical Sciences Ireland 2011, February 21-22, 2011, *(POSTER)*.

• R. Gorkin, M. Czugala, C. Rovira-Borras, J. Ducree, D. Diamond, F. Benito-Lopez, "***A Wireless Paired Emitter Detector Diode Device as Optical Sensor for Lab-On-A-Disc Applications"***, Transducers-2011,The 16th International Conference on Solid-State Sensors, Actuators and Microsystems, June 5-9, 2011, Beijing, China. *Accepted (POSTER).*

AIMED CONFERENCE:

• **The 15th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS),** October 2-6, 2011, Seattle, USA.

Acknowledgements

The authors wish to thank to the Marie Curie Initial Training Network funded by the EC FP7 People Programme and Science Foundation of Ireland under grant 07/CE/I1147.
Authors wish to thank also to Robert Gorkin and Jens Ducree (BDI), Candice Bin and Peer Fischer (IPM), Carlos Rovira (CLARITY) for their contribution to the work presented here.

Marie Curie Initial Training Network