Applications of Novel Functional Materials based on ionic liquids: from Microfluidics to Chemical Sensing

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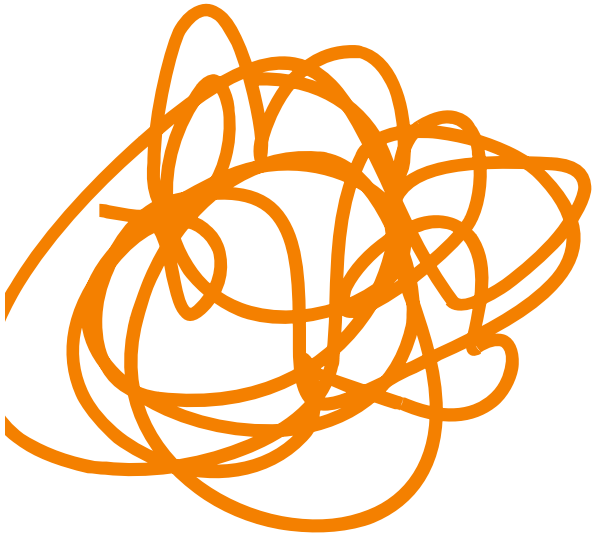
€€€: IRCSET-2089

MATERIALS

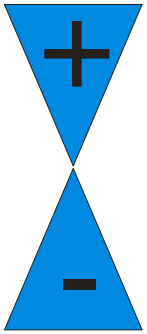
3 building blocks

IONOGLES

POLYMER MATRIX

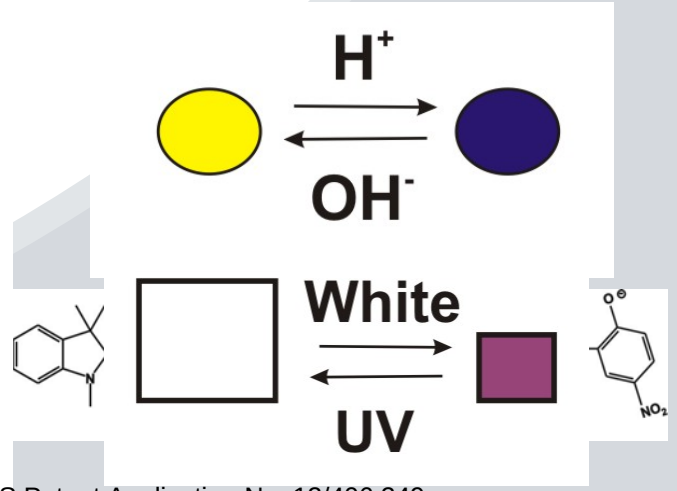


IONIC LIQUID (I.L.)



SENSING AGENT

- Dyes
- Photo-switchable molecules



Photoresponsive Ionogel. R. Byrne, F. Benito-Lopez, D. Diamond, Dublin City University, **2009**, New US Patent Application No: 12/406,249.

PH Sensor Device Comprising Ionogel Polymers. F. Benito-Lopez, R. Byrne, D. Diamond, Dublin City University, **2009**, Patent Application No: GB 0904627-7.

PROPERTIES

- EASY TO SYNTHESIZE

Just mix!!

- ENDLESS VARIATION IN THEIR PROPERTIES

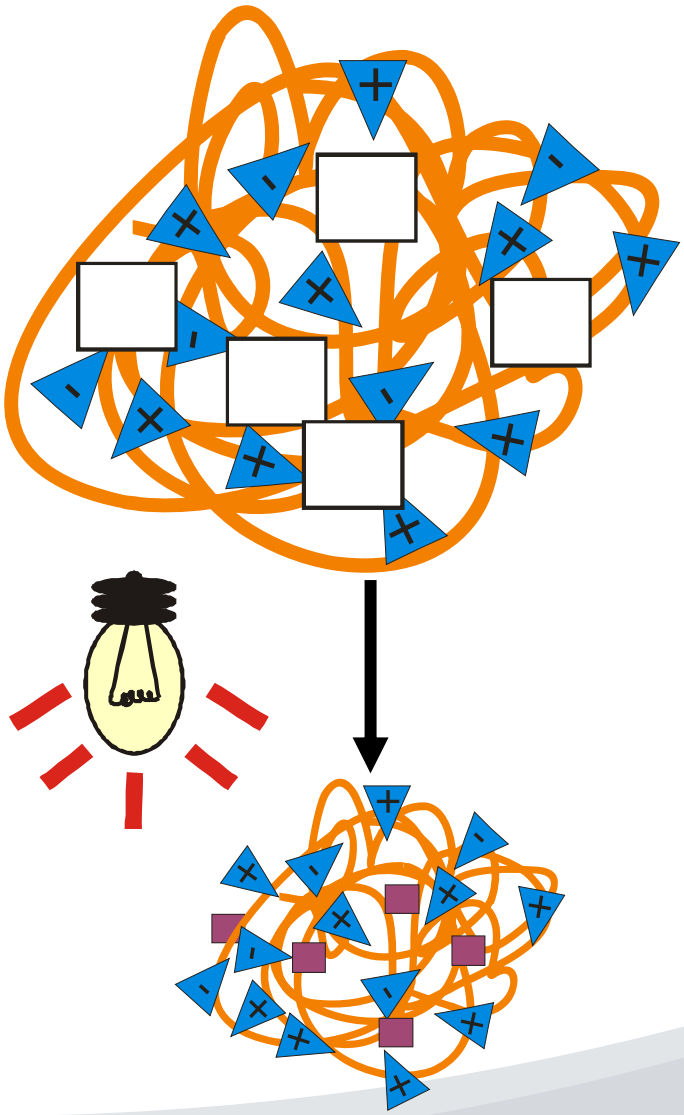
  robustness,
  acid/ base character
  viscosity ….

Just vary the I.L. or the polymer!!

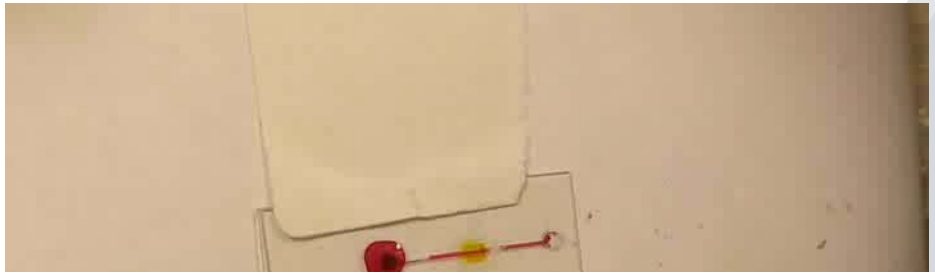
- EASY INCORPORATION INTO DEVICES

Photo-polymerisation

VALVE



FLUID CONTROL BY LIGHT
REUSABLE
EASY FABRICATION
VERSATILITY
MASS PRODUCTION

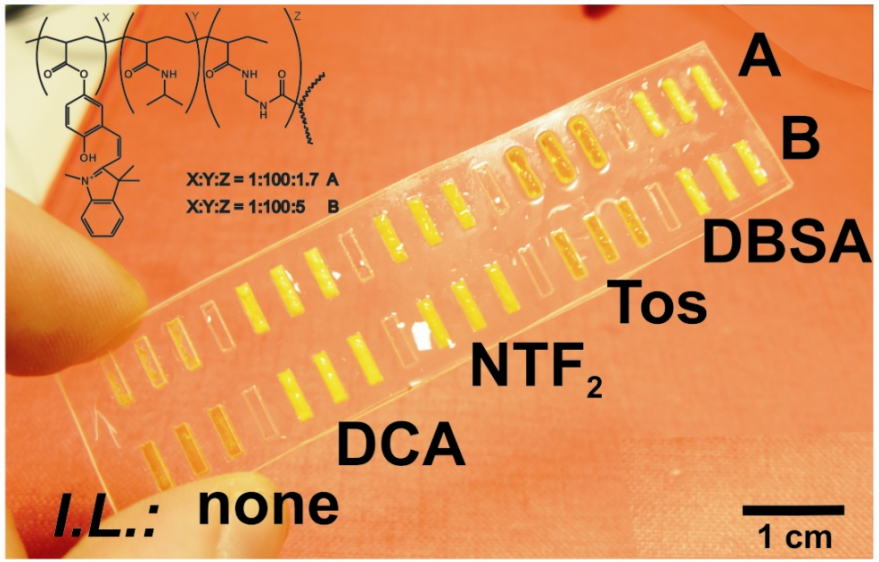


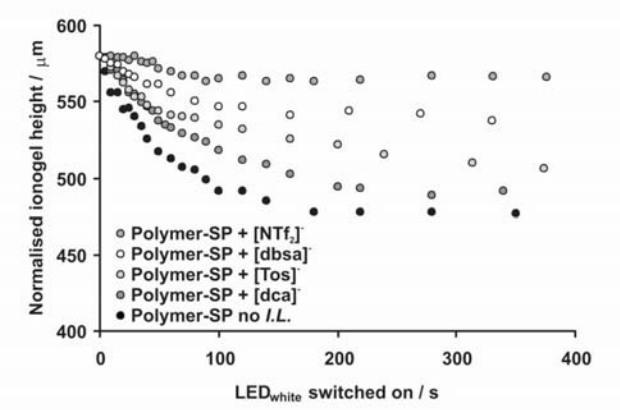
COMMERCIAL APPLICATIONS:

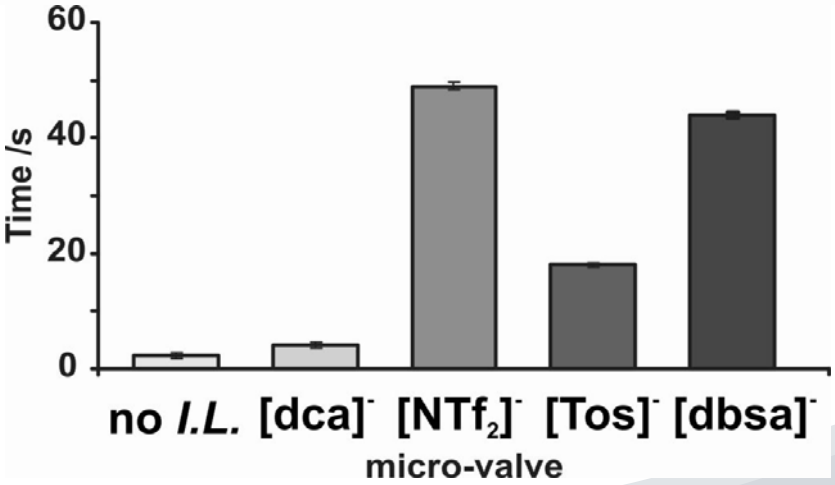
FLOW CONTROLLER IN CATHETERS, CAPILLARIES AND SMALL PIPES
DRUG DELIVERY SYSTEMS
PORTABLE DEVICES
POINT OF CARE DEVICES

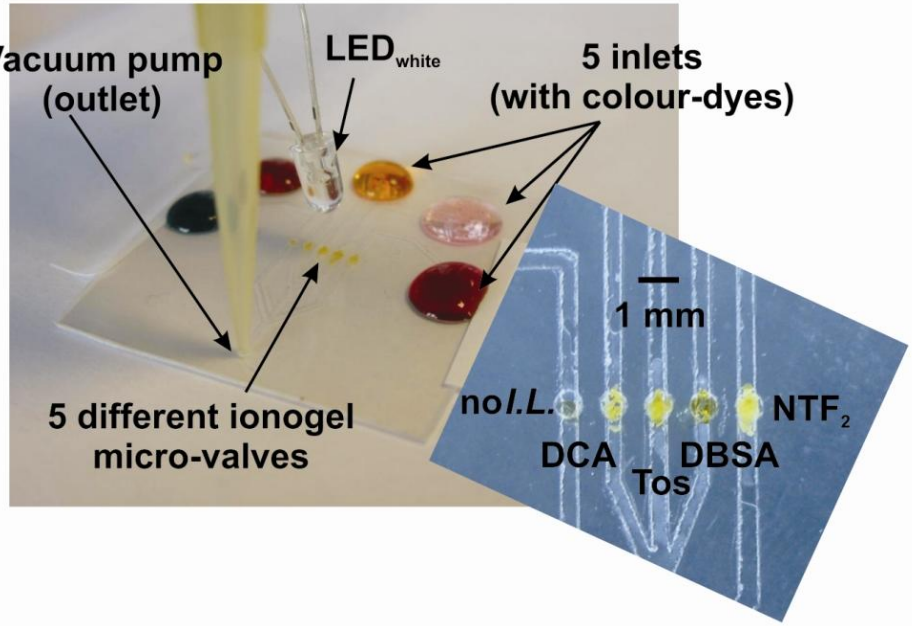
F. Benito-Lopez, R. Byrne, A. M. Raduta, N. E. Vrana, G. McGuinness D. Diamond. Lab Chip. ***2009***, DOI:10.1039/B914709H

VALVE



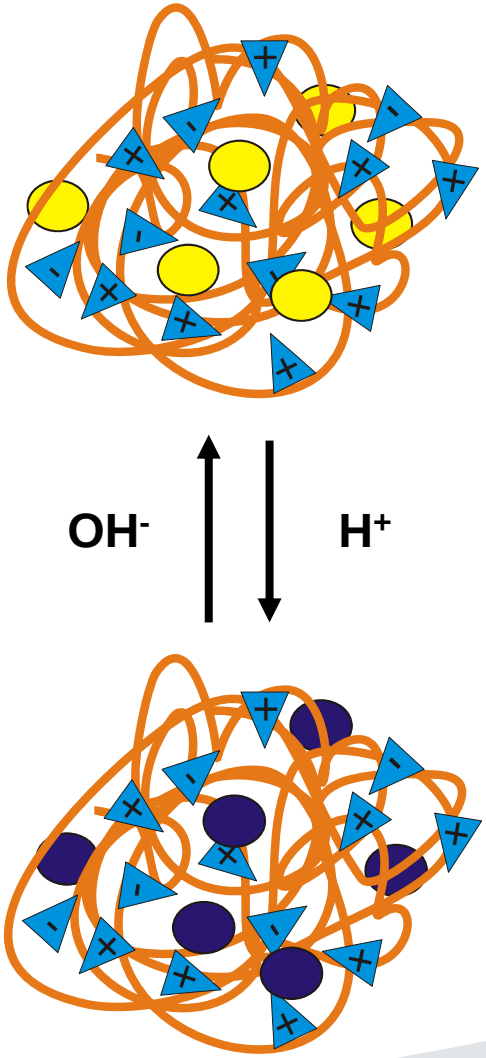






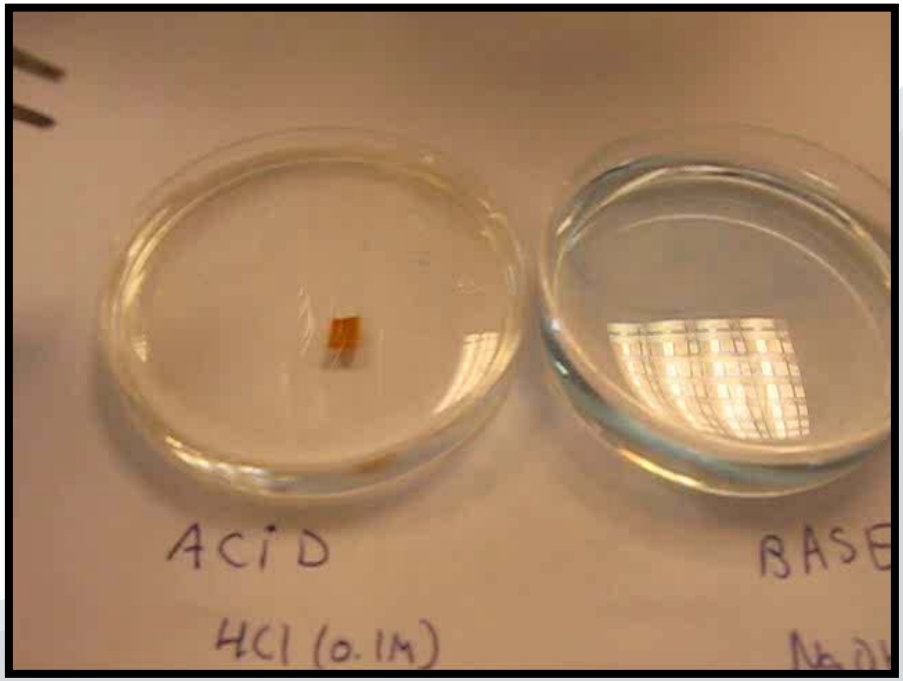
Photoresponsive Ionogel. R. Byrne, F. Benito-Lopez, Dermot Diamond, 2009, New US Patent Application No: 12/406,249.
F. Benito-Lopez, Robert Byrne, Dermot Diamond, μ-TAS-2009, 1-5 November, Jeju, Korea, 2009. Accepted.

SENSOR



CHEAP
EASY TO FABRICATE
NO CHEMICAL MODIFICATION
NO LEACHING

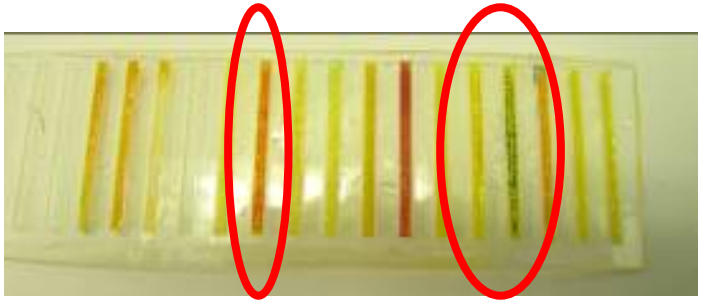
UNIVERSAL
REUSABLE
LONG TERM DURATION
MASS PRODUCTION



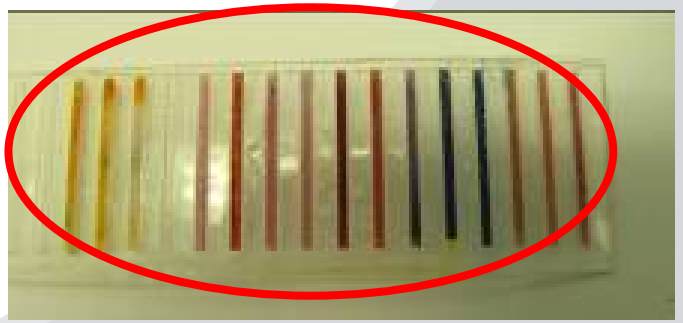
APPLICATIONS

BARCODE GAS SENSOR

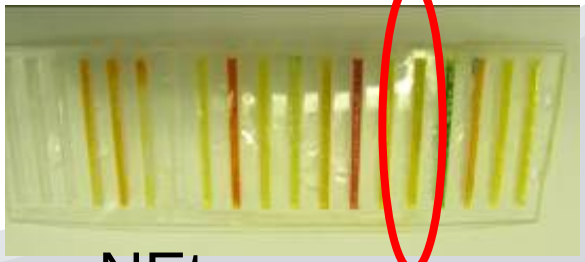
DI water



HCl vapours



NH_4^+ vapours

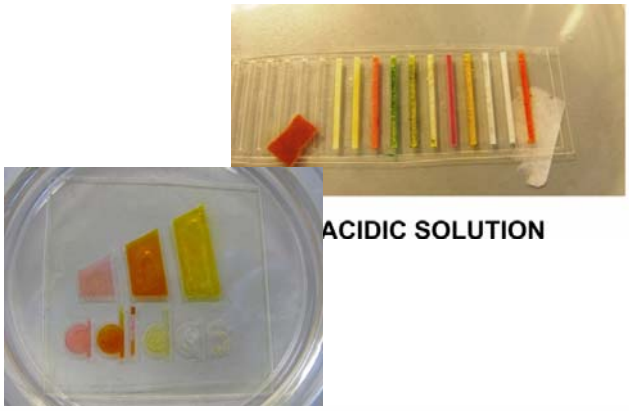


NEt_3 vapours

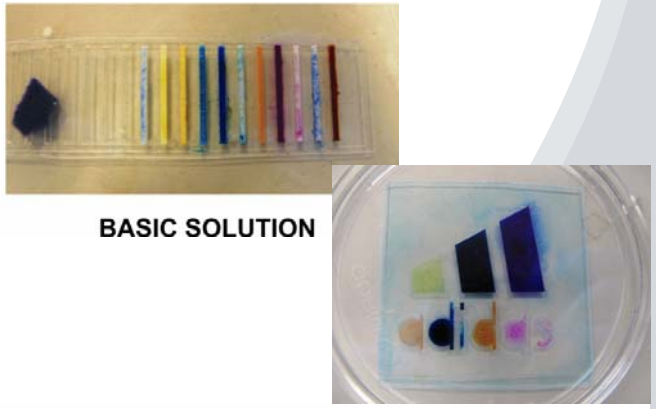
D. Diamond, R. Byrne, S. Scarmagnani, A. Radu, F. Benito-Lopez
in Active Polymers, edited by A. Lendlein, V. Prasad Shastri, K. Gall (Mater. Res. Soc. Symp. Proc. Volume 1190, Warrendale, PA, ***2009***) *1190-NN08-01.*

APPLICATIONS

BARCODE pH SENSOR

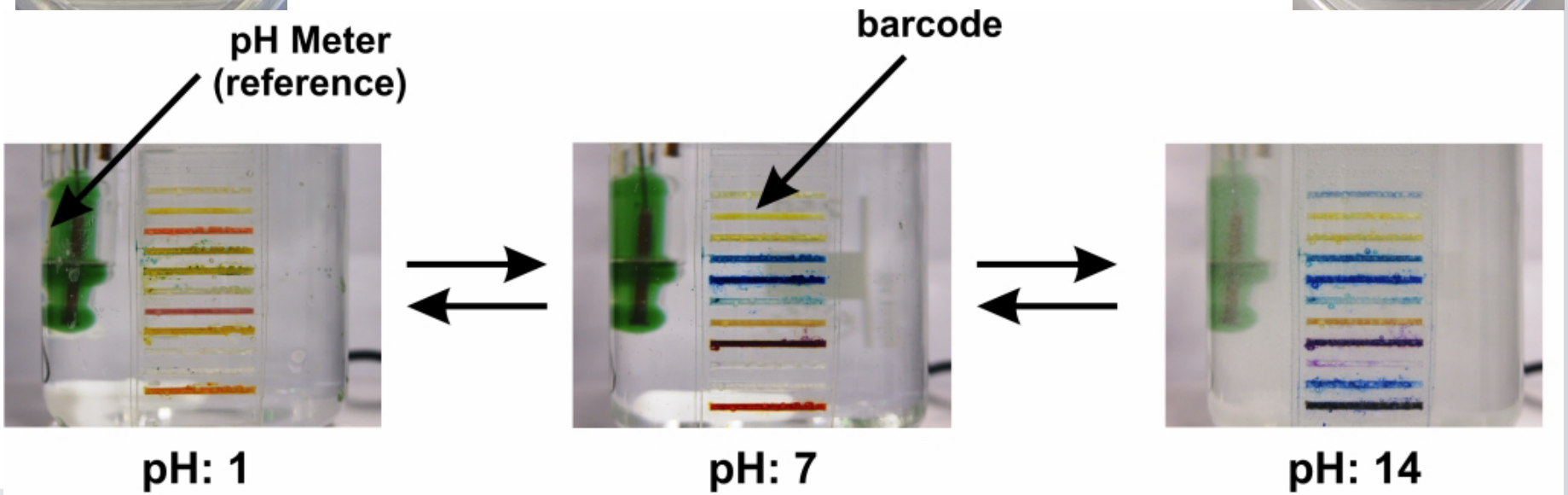


ACIDIC SOLUTION



BASIC SOLUTION

DINAMIC PROCESS



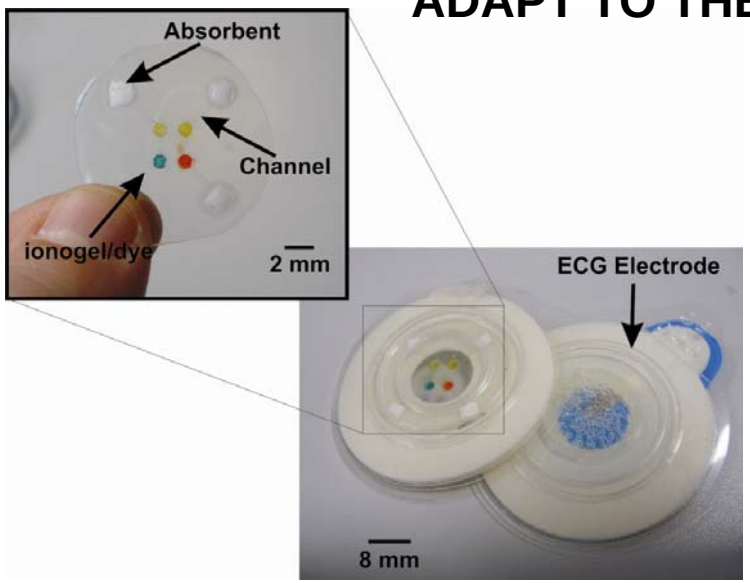
F. Benito-Lopez, R. Byrne, D. Diamond. Pittcon Conference-2002, Orlando, Florida, USA, 28 March - 5 March, **2010**. Accepted.

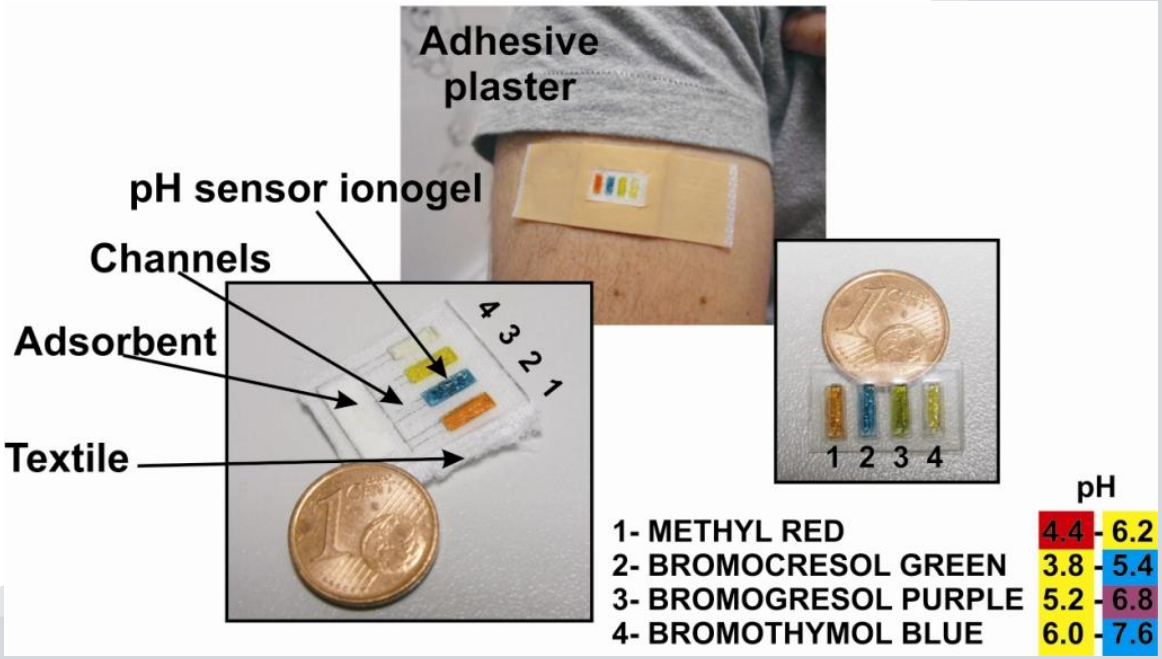
APPLICATIONS

Sweat Plaster Adhesive & Microfluidic device

Wearable device to provide immediate feedback to the user regarding the pH level of their sweat.

FLEXIBLE
ADAPT TO THE BODY EASILY



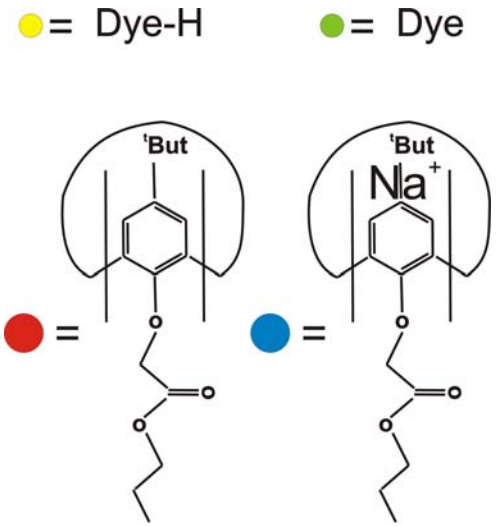


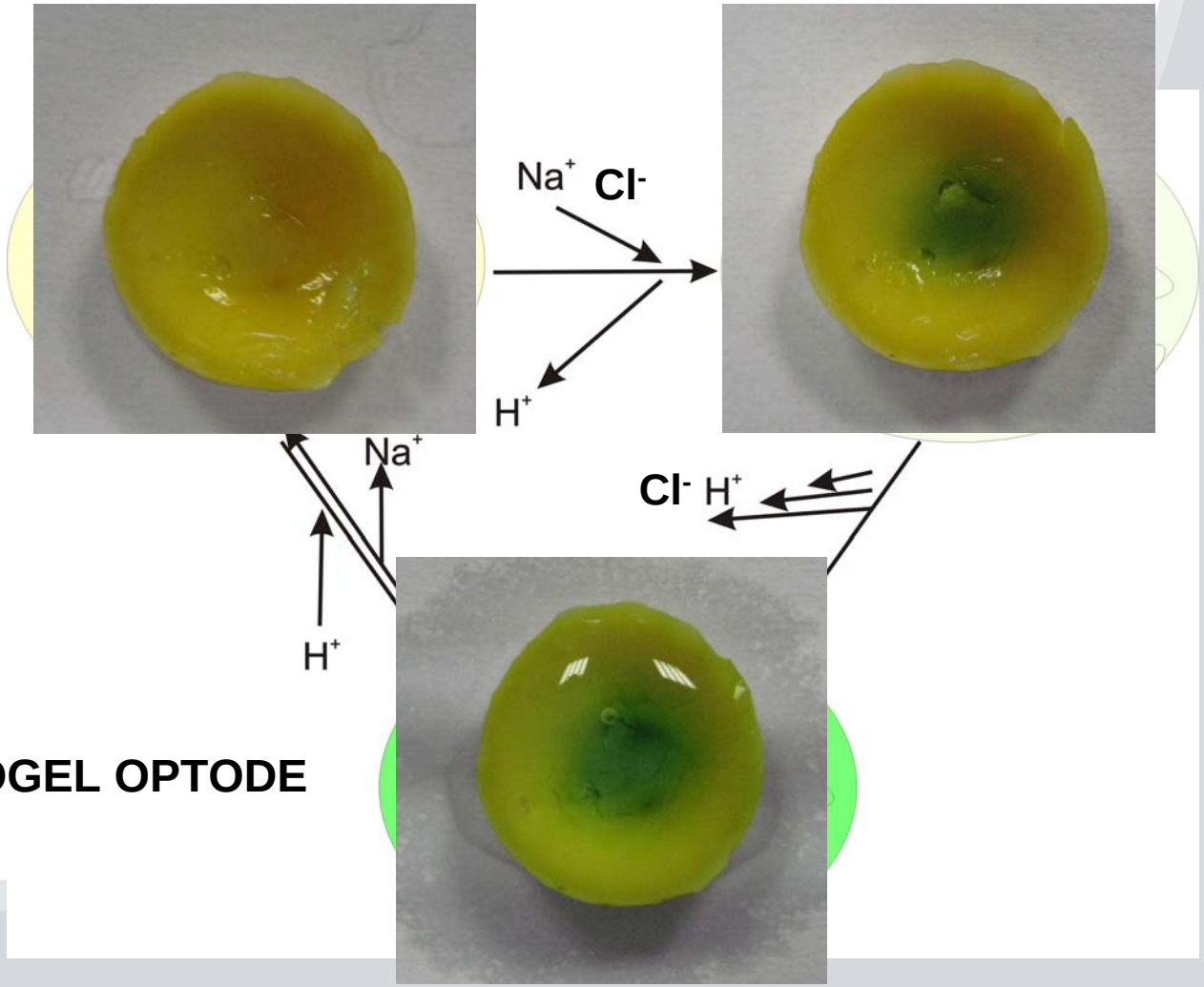
Prototype:

The Smart Sweat-Band. F. Benito-Lopez, S. Coyle, R. Byrne, A. Smeaton, N. E. O'Connor, N. Moyna, D. DiamondSmart Textiles Salon a joint European workshop, 25 September, Ghent, Belgium, 2009.

APPLICATIONS

CHEMICAL SENSOR





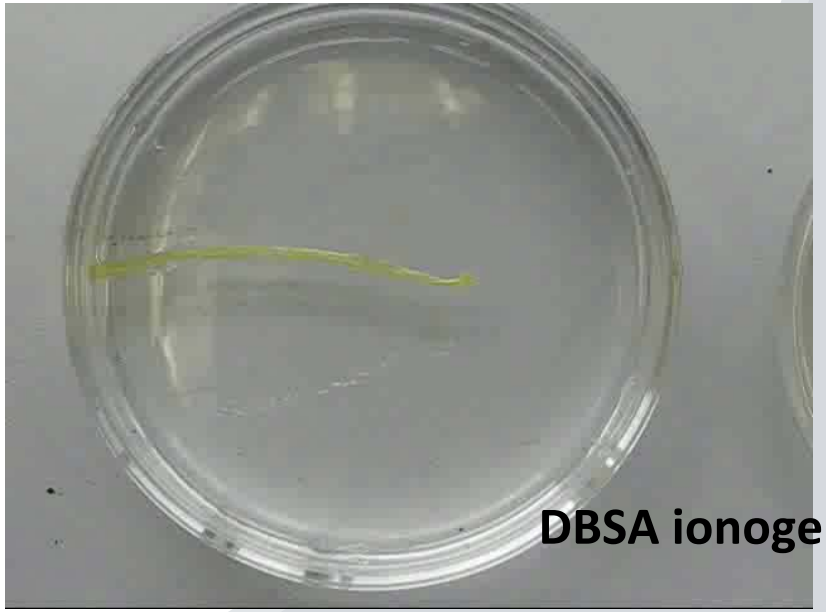
SODIUM SELECTIVE IONOGEL OPTODE

Schizophrenic Materials

When impregnating photoresponsive gels with ILs it is possible to tune the characteristics of photoresponsive gels (acid/ base character, viscosity etc.) by simply changing the IL.

DCA ionogel

Tos ionogel



DBSA ionogel

PH Sensor Device Comprising Ionogel Polymers. F. Benito-Lopez, R. Byrne, et al. 2009, Patent Application No: GB 0904627-7.
R. Byrne, F. Benito-Lopez, et al. Adv. Mater. 2009. Submitted

Schizophrenic Material

NCSR
National Centre for Sensor Research

CLARITY
clarity-centre.org