



Lourdes Basabe
Ikerbasque Research Professor



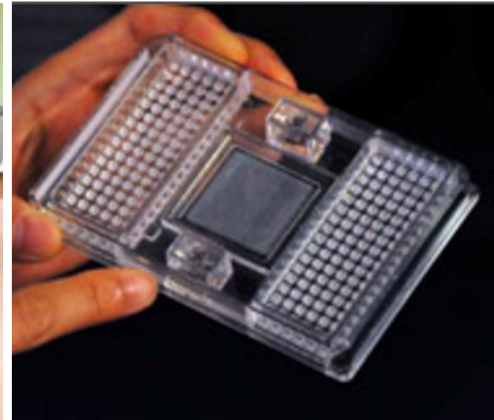
Microfluidics
Cluster
UPV/EHU

Since 2015 @ University of the Basque Country,
Vitoria-Gasteiz, Spain



Fernando Benito
Assoc. Prof UPV/EHU

MICROCHIPS FOR ANALYSIS OF FLUIDS AND BIOLOGICAL SYSTEMS



ANALYTICAL MICROSYSTEMS, CHEMICAL AND CELLULAR MONITORING DEVICES

Clinical practice



Enviromental control



Sport science and activity



Food quality



Biological research



Space

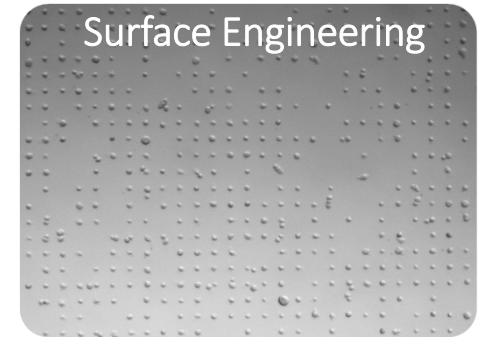


Microfabrication, nanotechnology and materials

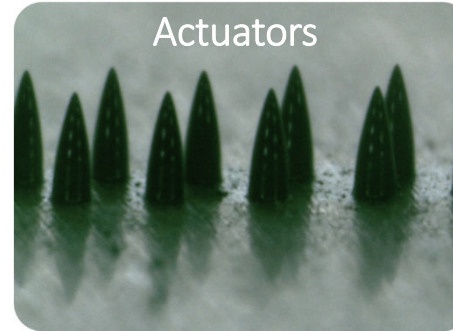
Microfluidics



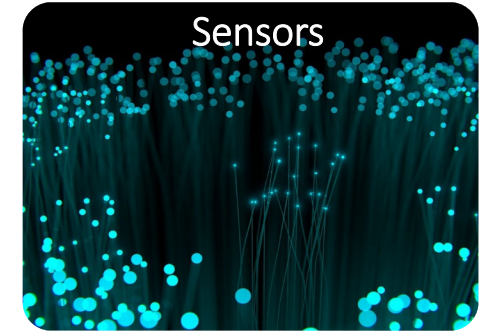
Surface Engineering



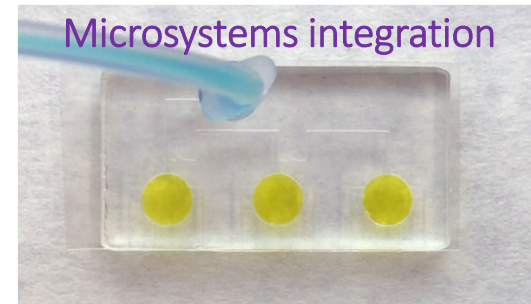
Actuators



Sensors

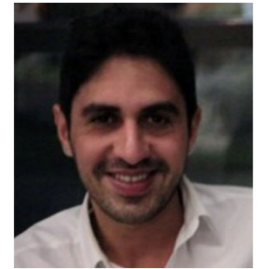
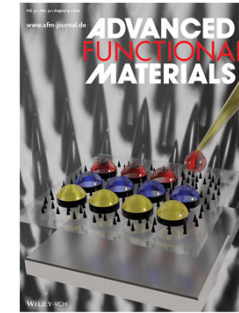
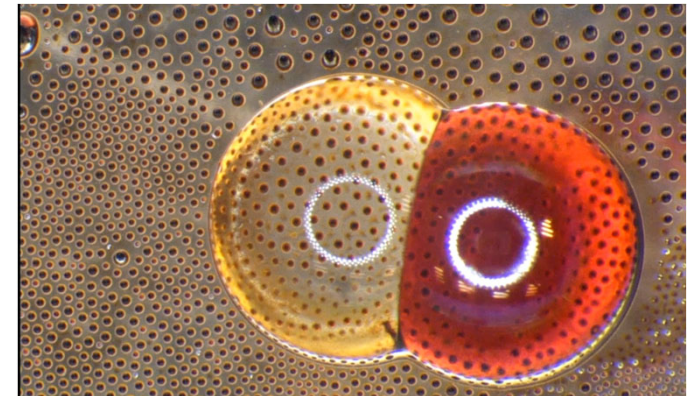
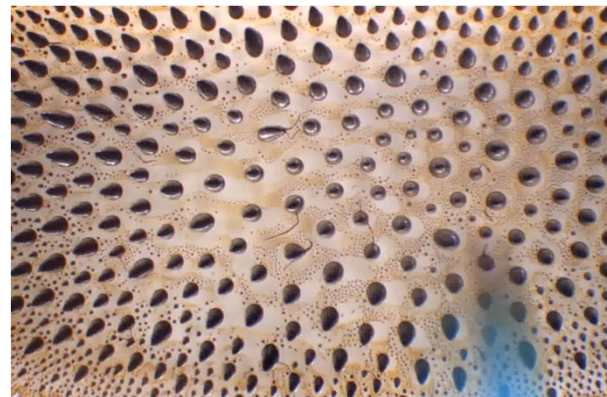
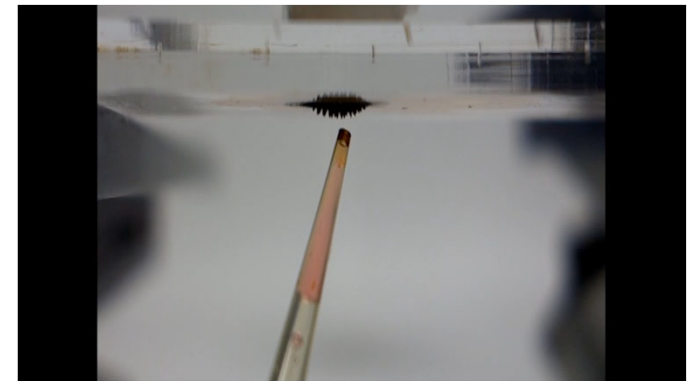
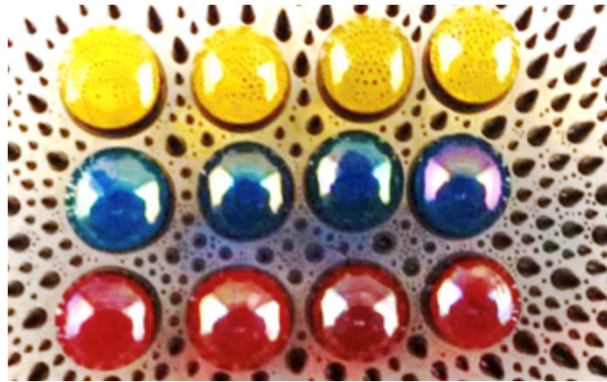
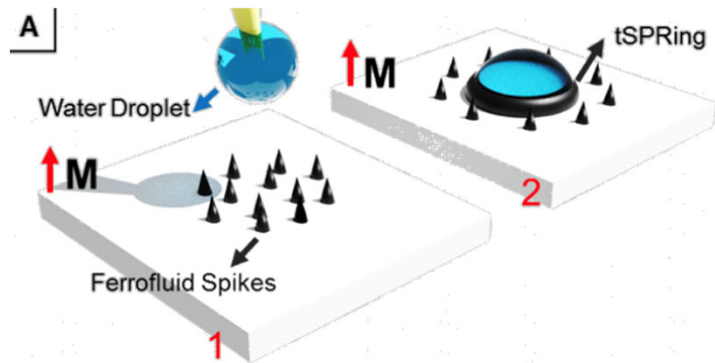


Microsystems integration



FUNCTIONAL MATERIALS FOR MICROFLUIDICS SYSTEMS

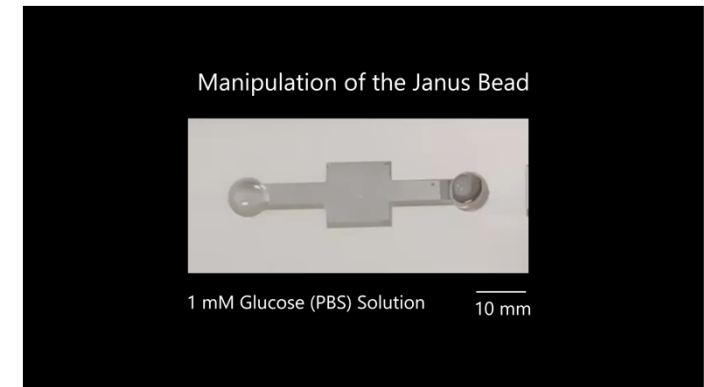
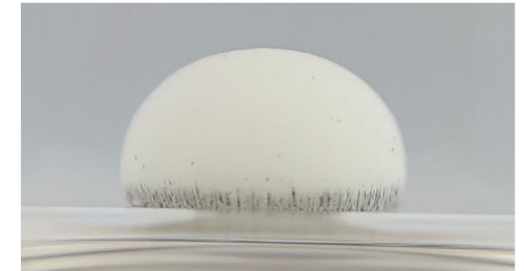
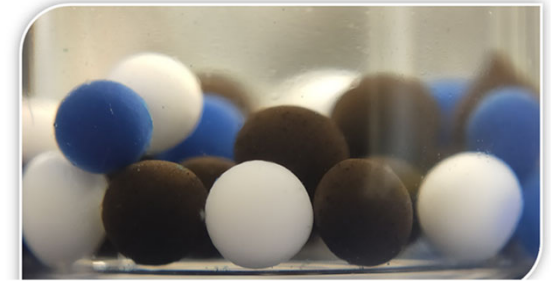
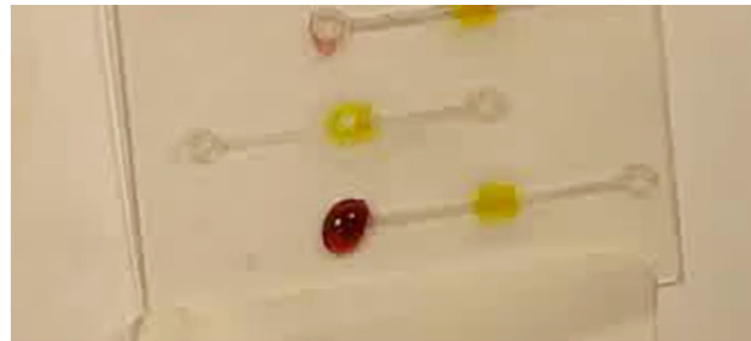
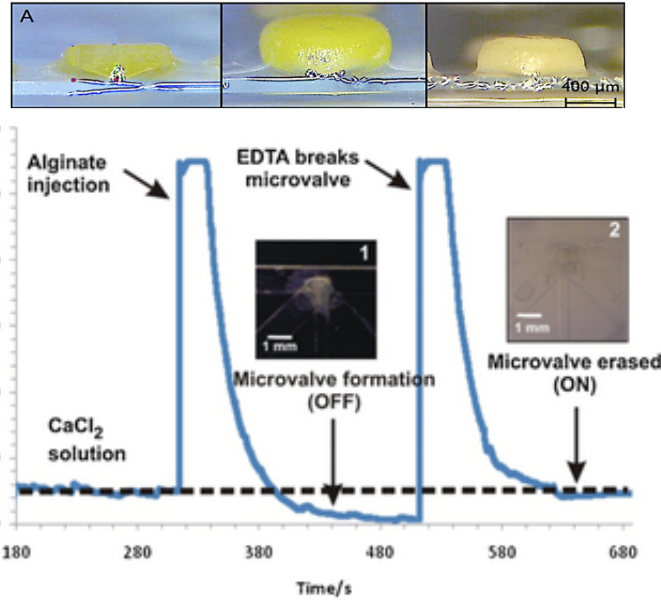
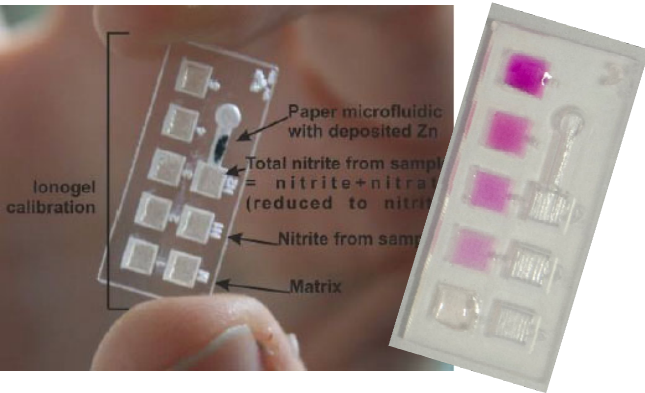
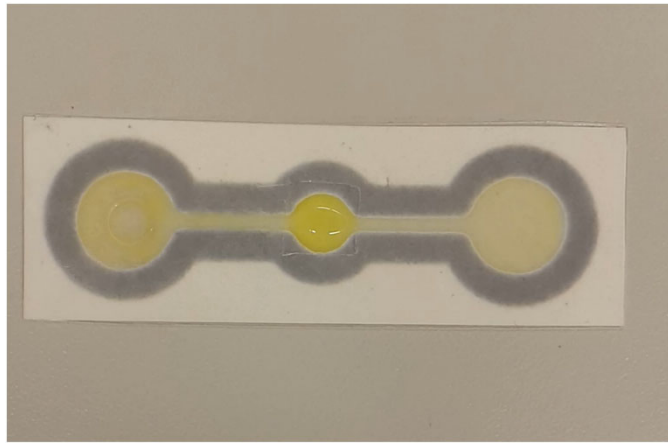
Open Surface Active Magnetic Digital Microfluidics



Vahid Nasirimarekani

Nasirimarekani, V. *Adv. Funct. Mater.*, 2021

FUNCTIONAL MATERIALS FOR SENSORS AND ACTUATORS



Akyazi T., et al. *SNB*, 2018

Saez J., *IEEE Sensors*, 2018

Benito-Lopez, et al., *Lab Chip*, 2010

Saez J., et al., *SNB*, 2015

Czugala M., et al., *SNB*, 2014

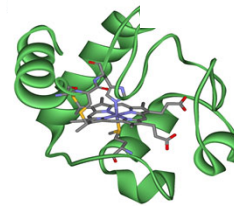
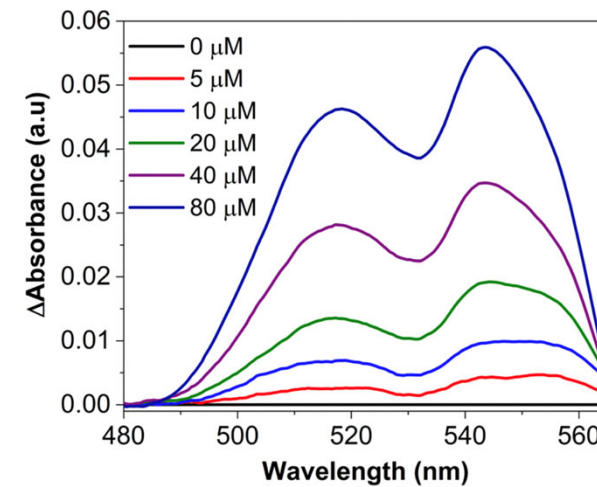
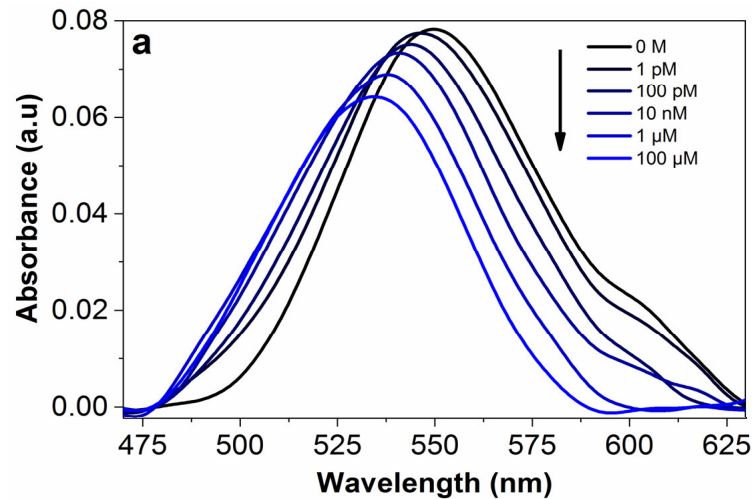
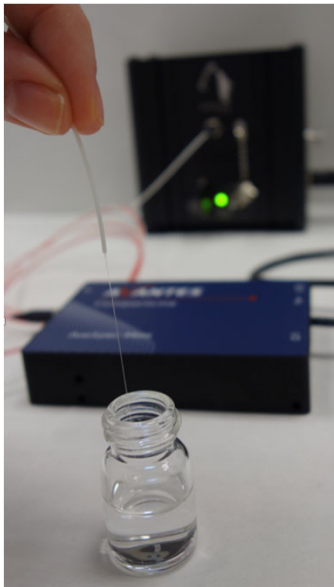
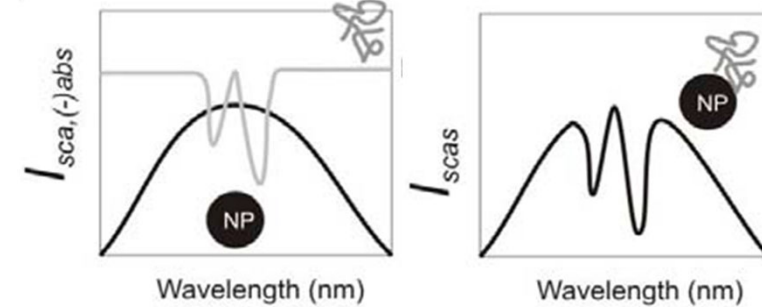
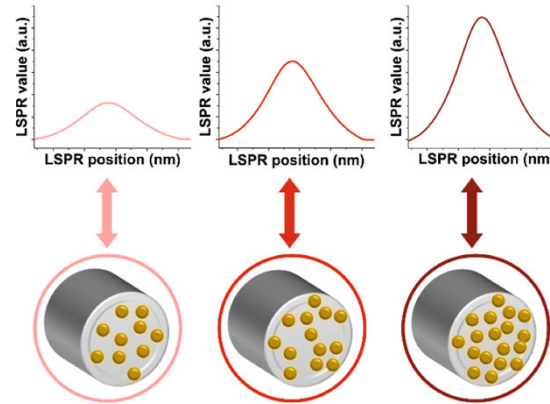
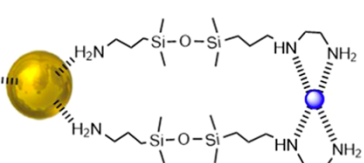
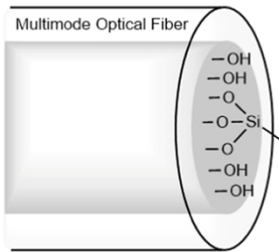
Bimendra, U. *ACS App. Mater. Interf.*, 2021

FUNCTIONAL MATERIALS FOR SENSORS AND ACTUATORS

Selective ultrasensitive optical fiber nanosensors based on plasmon resonance energy transfer.









Javier Barroso Alba Calatayud

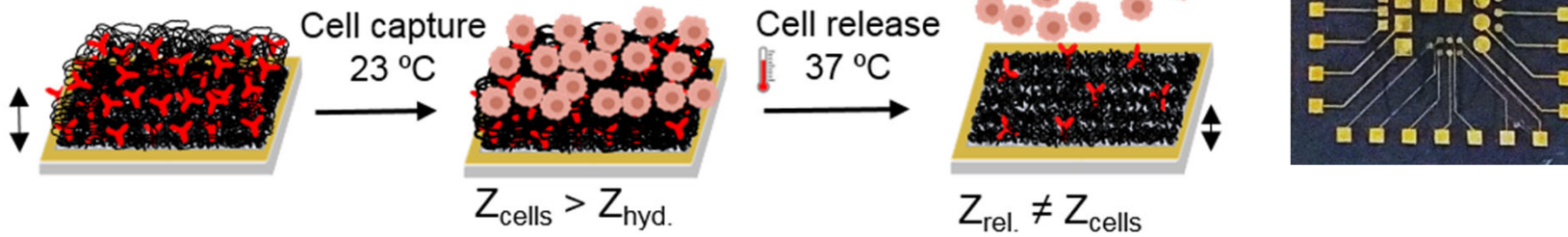


In collaboration with Prof. Joel Villatoro (UPV/EHU). Barroso, J., *ACS Sensors*, **2020**; Ortega, A., *SNB* **2021**; *Sci. Reports* **2022**

FUNCTIONAL MATERIALS FOR SENSORS AND ACTUATORS: BIOELECTRONICS

An Electroactive and Thermo-responsive Material for the Capture and Release of Cells

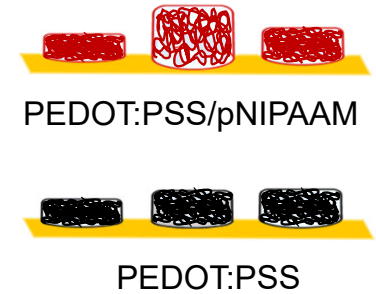
-  Glass slide
-  Gold electrode
-  Swollen PEDOT:PSS/pNIPAAm
-  Actuated PEDOT:PSS/pNIPAAm
-  Fibronectin
-  SW480 cells



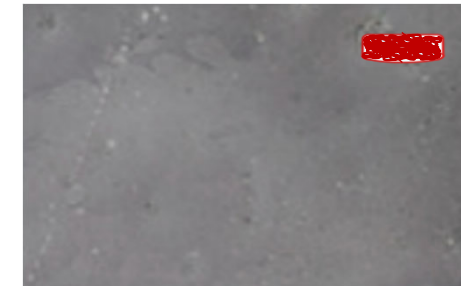
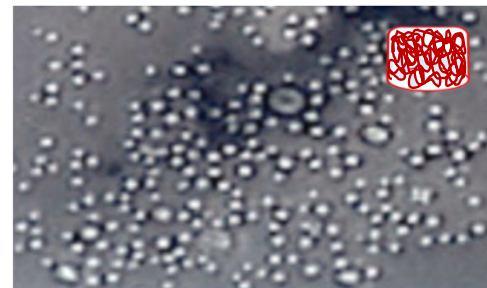
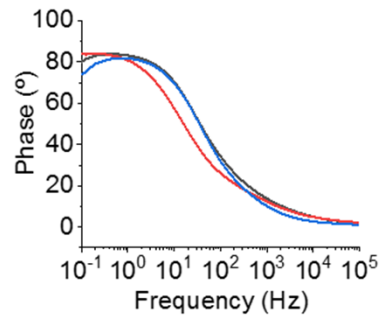
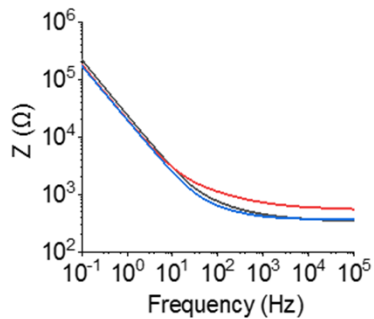
Janire Saez



Maite Garcia

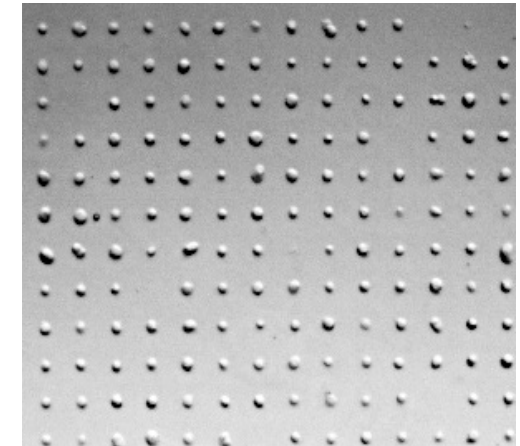
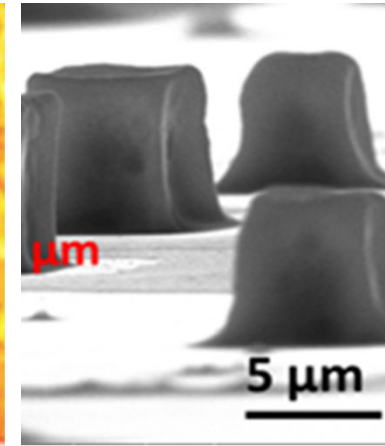
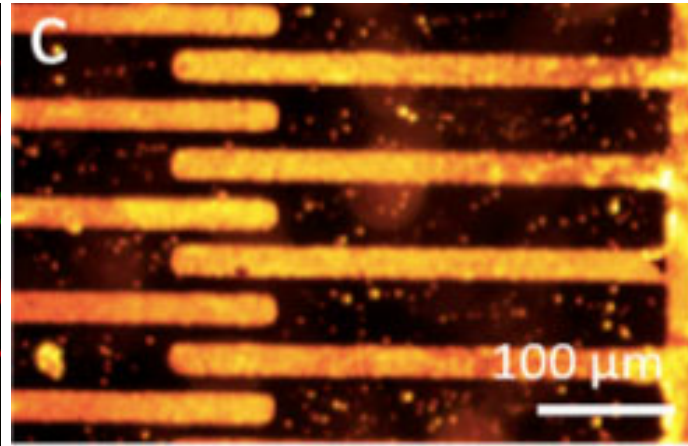
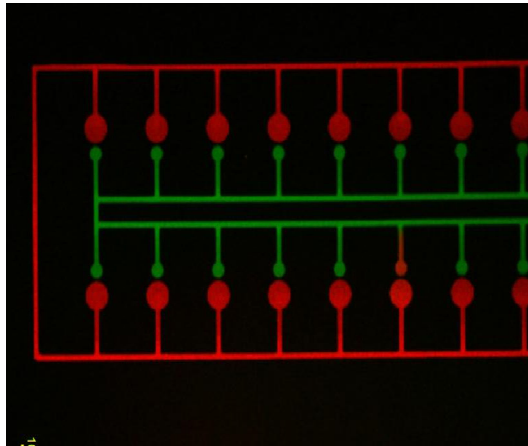
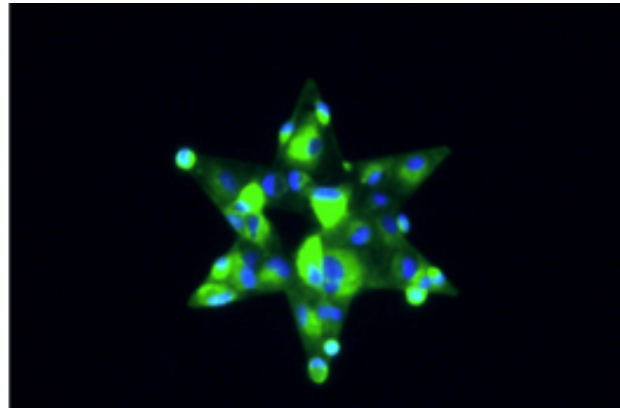
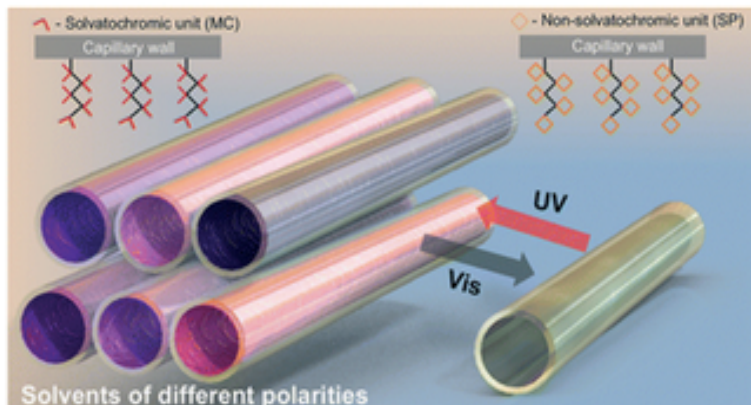


- PEDOT:PSS/pNIPAAm 23 °C
- PEDOT:PSS/pNIPAAm 23 °C + cells
- PEDOT:PSS/pNIPAAm 37 °C



García-Hernando, M., Biosens. Bioelectron. 2021

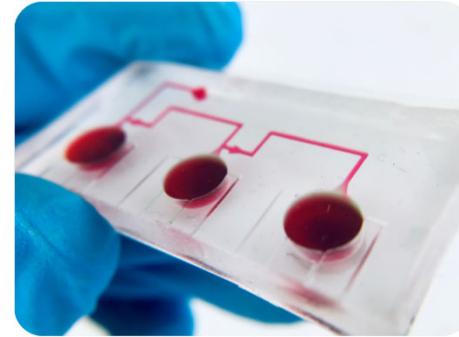
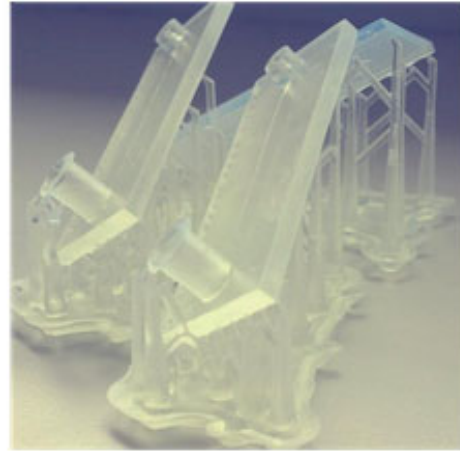
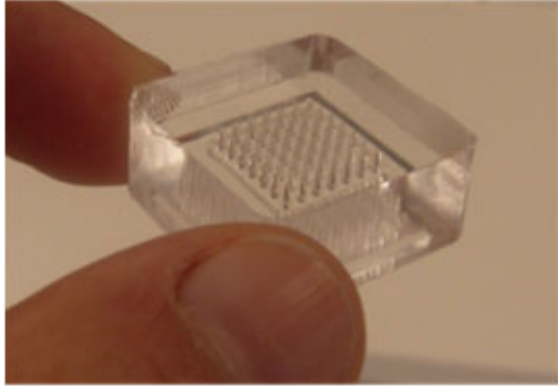
SURFACE ENGINEERING THROUGH CHEMISTRY



Hamon, C., *Adv. Funct. Mater.*, **2016**
Hamon, C., *ACS Nano*, **2014**

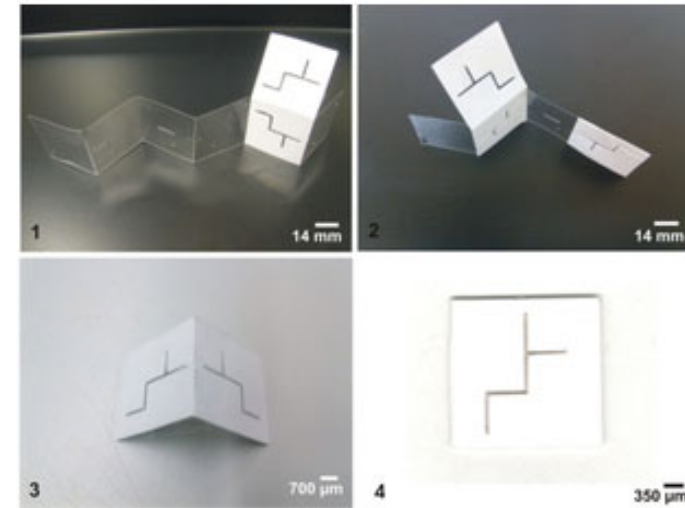
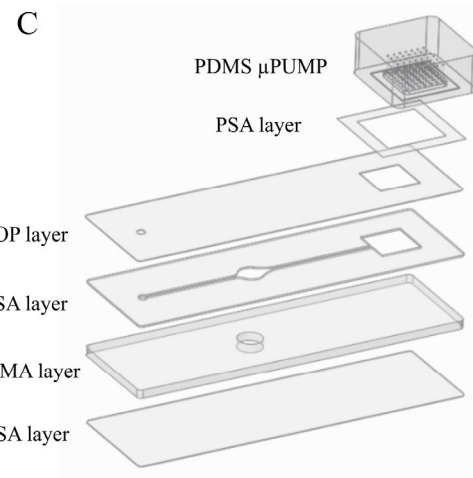
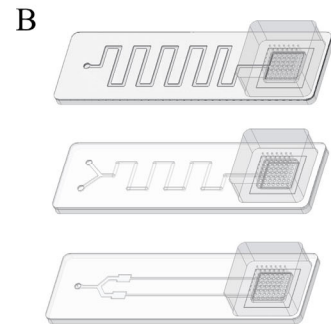
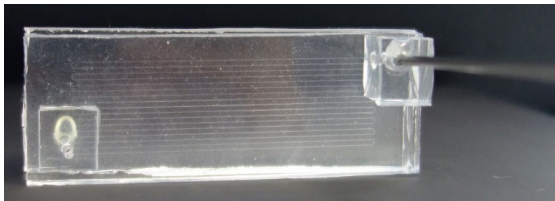
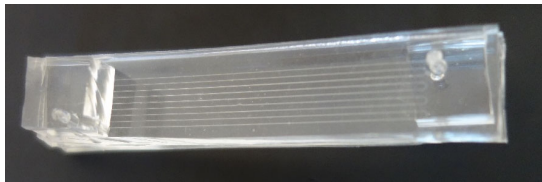
García-Hernando, M., *Anal. Chem.*, **2019**
Gonzalez-Pujana, A. *SNB*, **2019**

MICROFLUIDICS SYSTEMS AND COMPONENTS



Jaione Etxebarria

Janire Saez

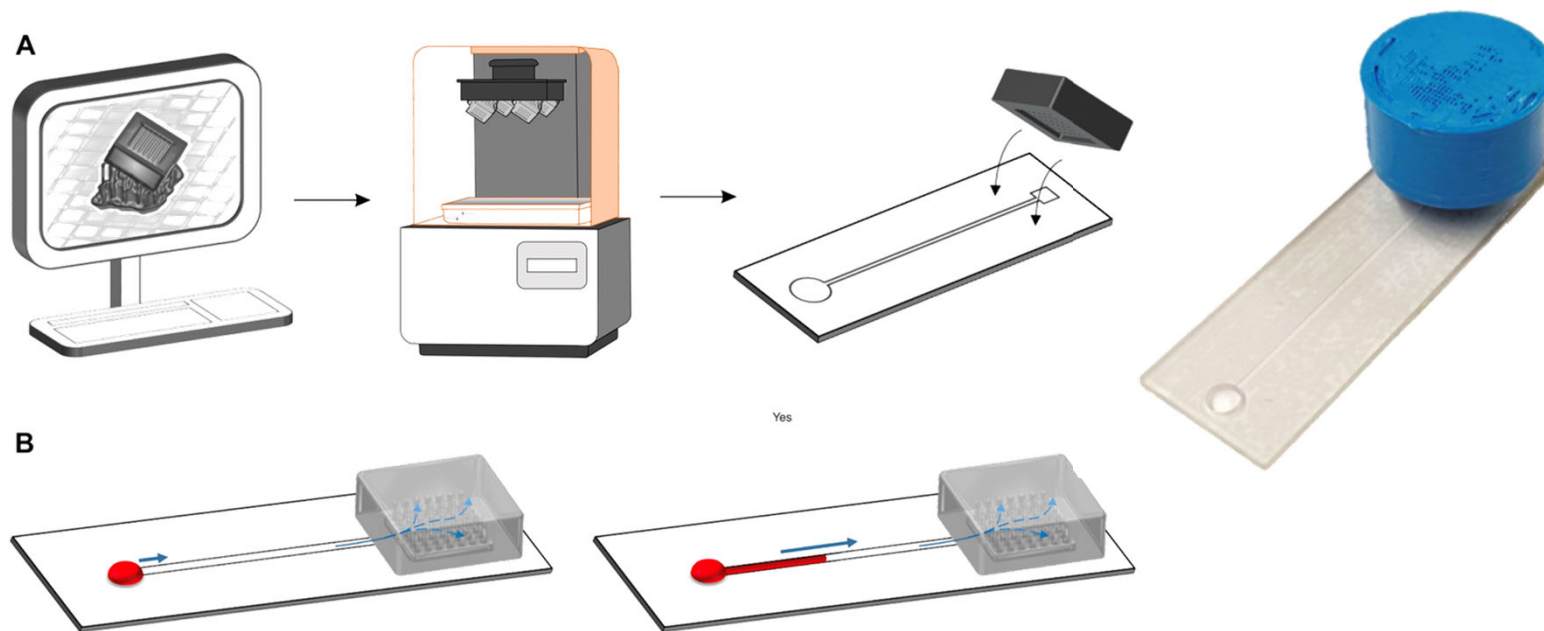


Saez, J., *Micro Nanofluids*, **2018**
 Etxebarria, J., *Ind Chem Eng*, **2020**
 Alvarez-Braña, Y., *Sens Act. B*, **2021**
 Espinosa, A., *Int. P. Pharm*, **2020**

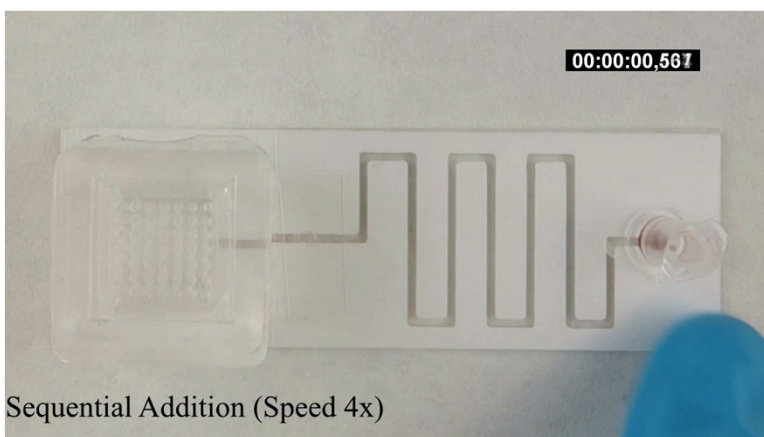
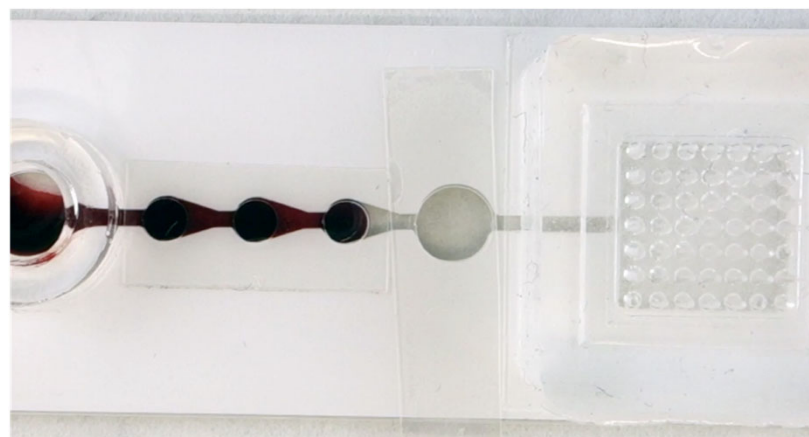
UNIVERSAL SELF-POWERED MODULAR MICROFLUIDIC DEVICES



Yara Alvarez



Etxebarria, J., *Ind Chem Eng*, 2020
Alverz-Braña, Y., *Sens Act. B*, 2021

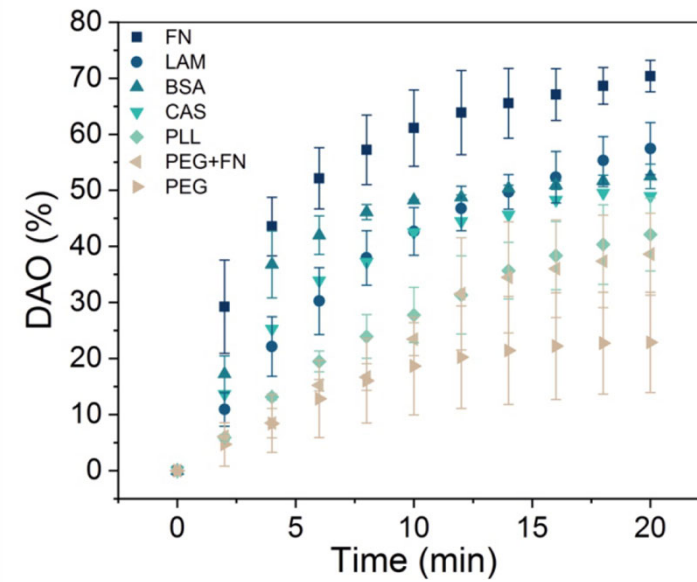
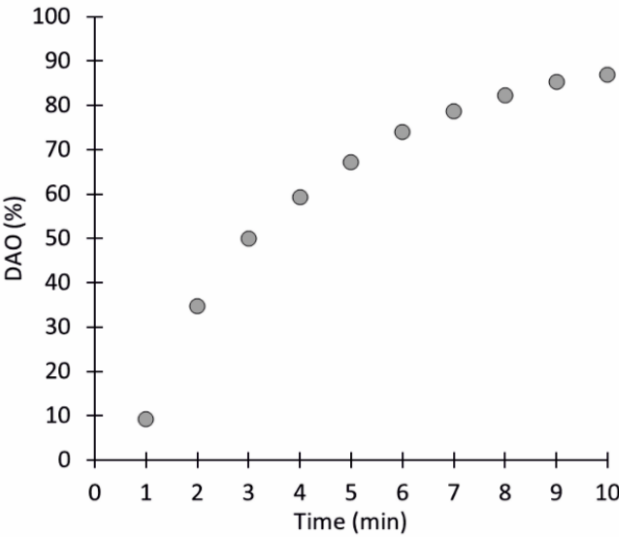
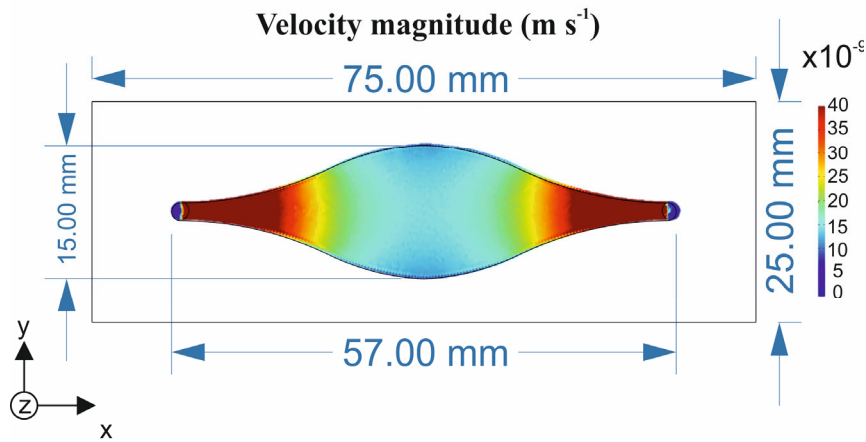
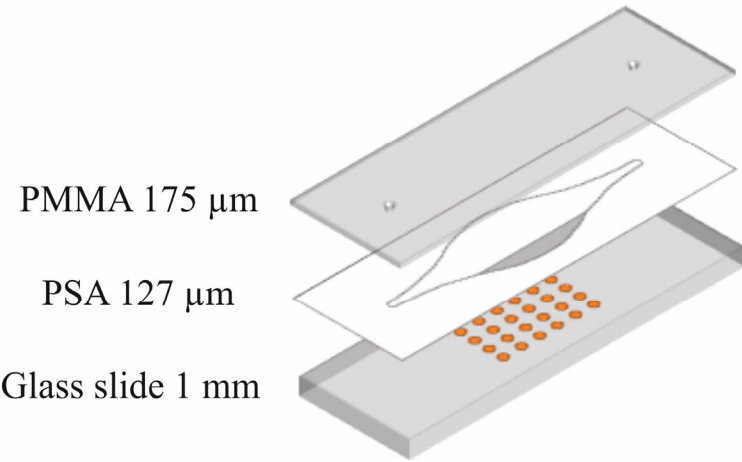
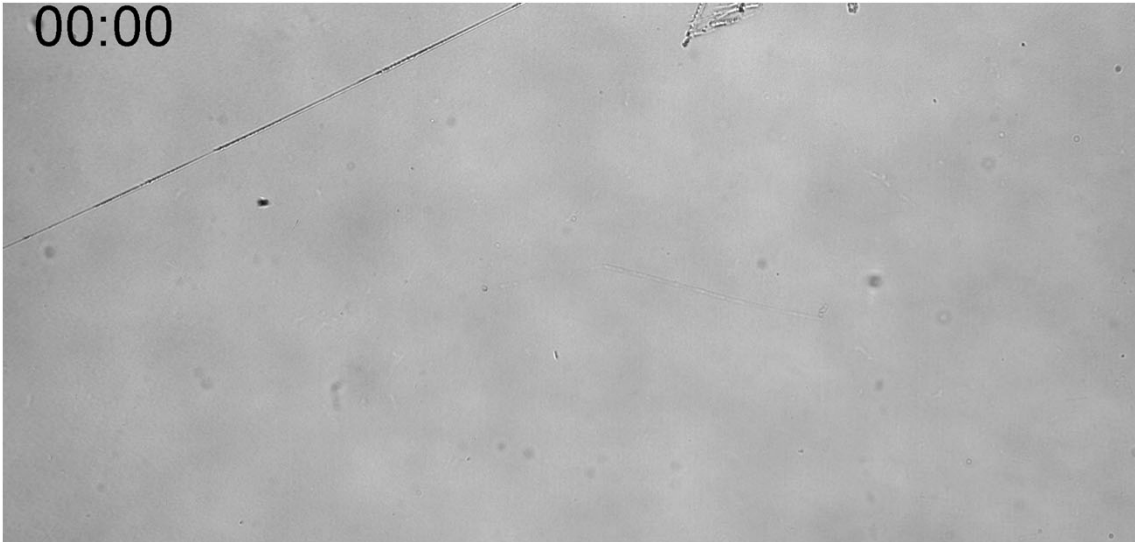


Sequential Addition (Speed 4x)

MICROSYSTEMS INTEGRATION : CELL ADHESION MICROCHIPS

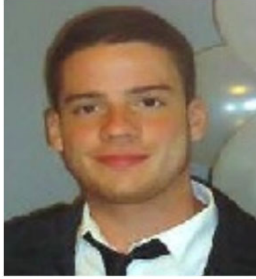


Alba Calatayud

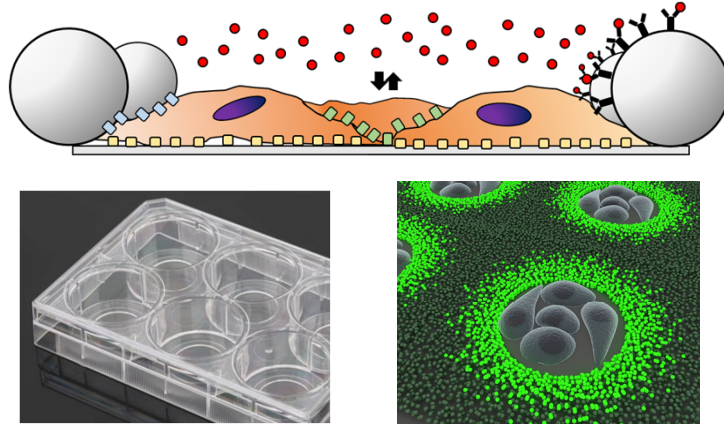
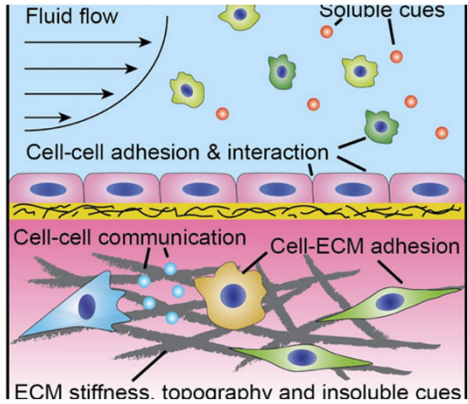


Calatayud-Sanchez, A., Manuscript in preparation

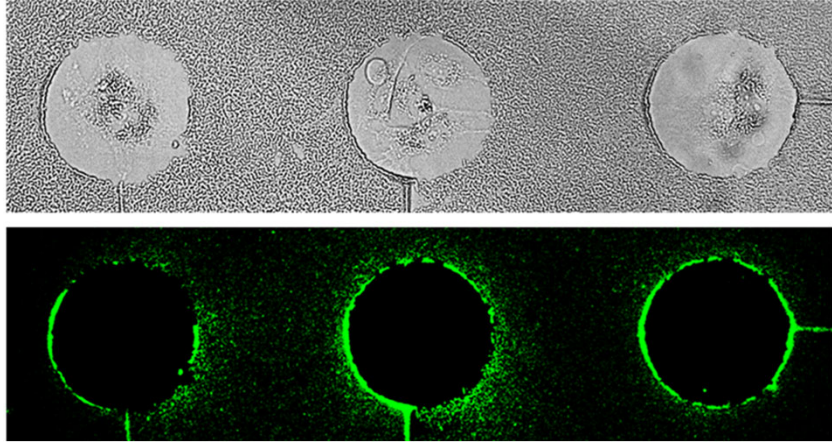
MICROSYSTEMS INTEGRATION : CELL STUDIO PLATFORMS



Enrique Azuaje



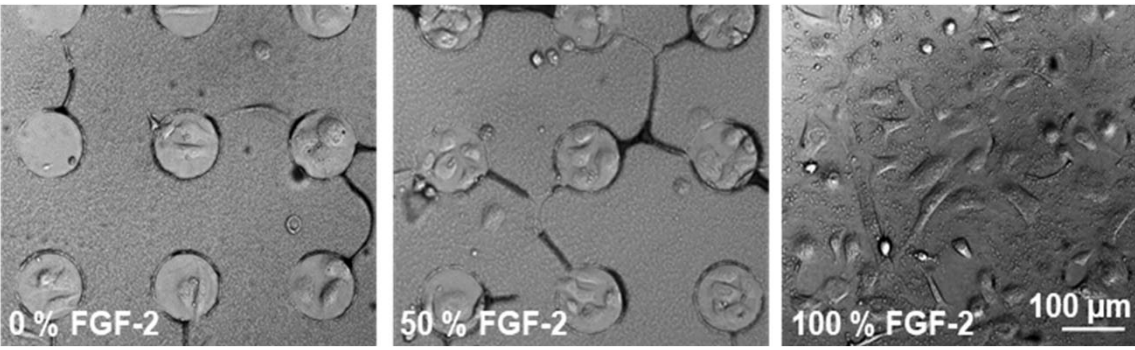
CELL SECRETION MONITORING



CELLSTUDIO® PLATFORM

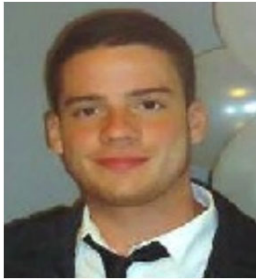


STIMULATION OF CELL PROLIFERATION

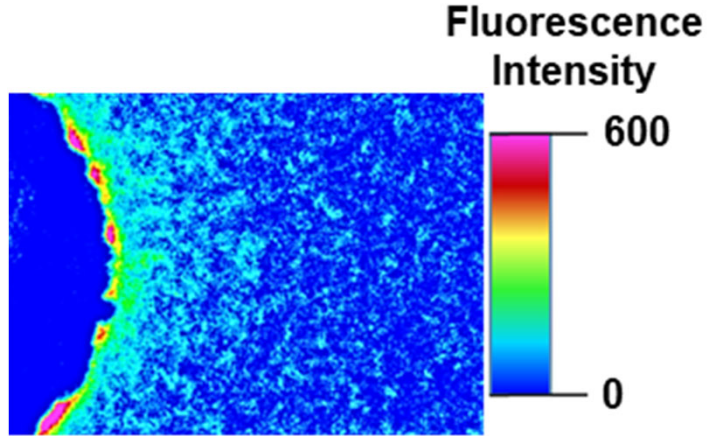
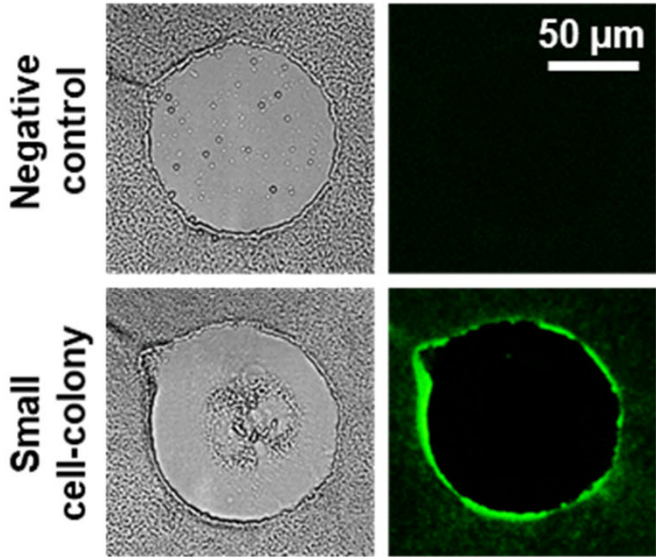
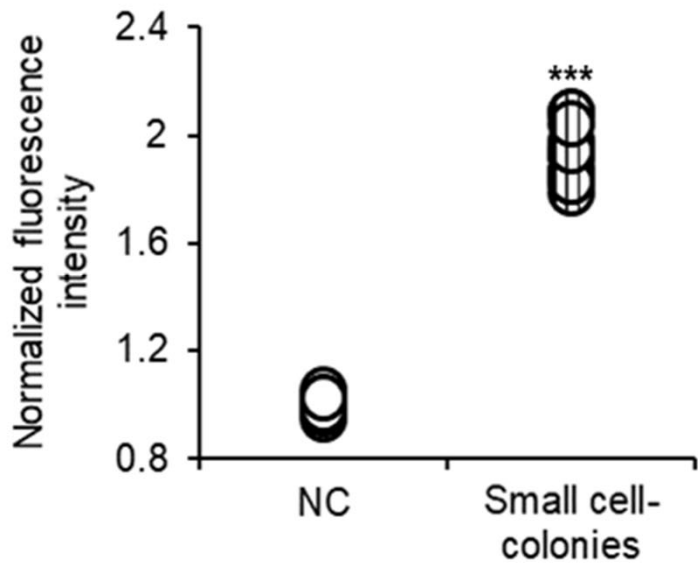
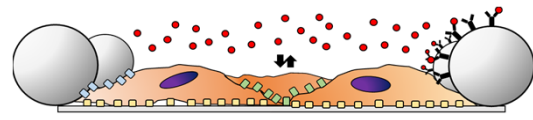
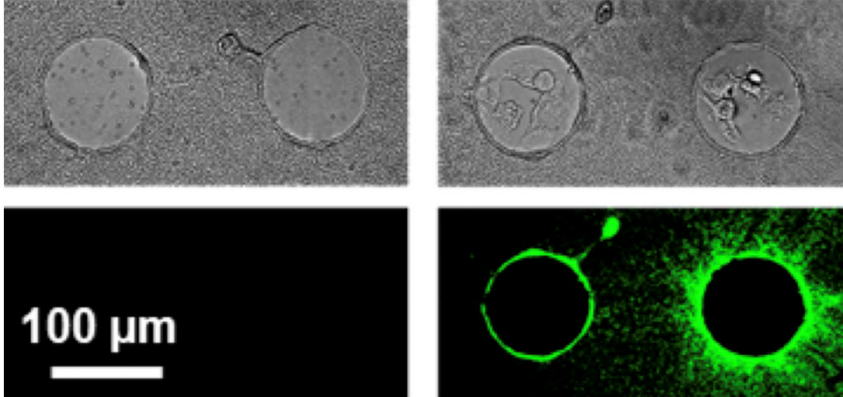
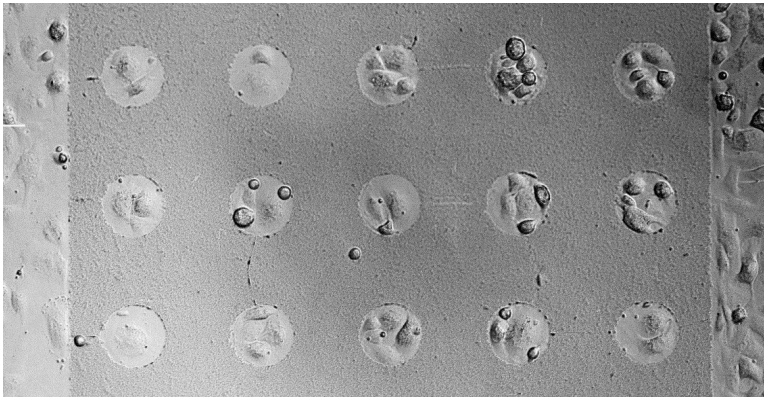


Azuaje E., EP21382840.3 (patent pending).
 Manuscript in preparation

MICROSYSTEMS INTEGRATION : CELL STUDIO PLATFORMS



Enrique Azuaje



Cell secretion
2.5-5 ng per 10⁶ cells per day

Azuaje E., EP21382840.3 (patent pending). Manuscript in preparation

ACKNOWLEDGEMENTS/ COLLABORATORS

Prof. Joel Villatoro UPV/EHU
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Prof. Brian McCraith, Dublin City University (Ireland)
Prof. Antonio J. Ricco, Stanford University & NASA (USA)
Prof. Luke Lee, University of California Berkeley (USA)



ACTIVE PROJECTS

1. DNASURF (H2020-MSCA-RISE-778001) European Commission
2. MAMI (H2020-MSCA-ITN-ETN-766007) European Commission
3. "H2020-MSCA-IF-2020 RhizoSheet" European Union - 2020 - 2022
4. "DISMOCAN (KK-2021/00025) Dispositivo optofluídico para la monitorización rápida on-site de niveles de antibióticos en sangre" SPRI - 2021 - 2023
5. MINECO 2021 ChemCellTec (PID2020-120313GB-I00)
6. COLAB20/10 UPV/EHU
7. Ideas Semilla AECC 2020
8. Fundación Eugenio Rodríguez Pascual



UPV EHU

GRUPO
spri
TALDEA



MAMI

Magnetics and Microhydrodynamics



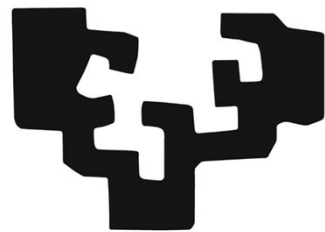
ikerbasque
Basque Foundation for Science



MICROFLUIDICS & BIOMICS CLUSTER UPV/EHU

Grupo consolidado IT633-22

(Vitoria-Gasteiz, desde 2018)



**Microfluidics
Cluster
UPV/EHU**



MICROFLUIDICS & BIOMICS CLUSTER
PI: Lourdes Basabe

BIOMICS

MICROFLUIDICS CLUSTER UPV/EHU

★ M. M. Pancorbo (PhD)

★ L. Basabe (PhD)

F. Benito (PhD)

Felix Olasagasti (PhD)

Ana M. Rocandio (PhD)

Marta Arroyo (PhD)

★ Iñigo Olalde (PhD)

★ Miriam Baeta (PhD)

★ Eva Granizo

★ Belen Navarro

Katerina Rafonne

Harkaitz Eguirraun (PhD)

★ Janire Saez (PhD)

Raquel Catalán

 ★ Sandra García

Sergi Cinca

Yara Álvarez

★ Alba Calatayud

Udara Bimendra



Joseba Totoricaguena



Jon Mercader

Daniel Patko (PhD)



★ Enrique Azuaje (PhD)

Naiara Rojo (PhD)

Gorka Gallastegui (PhD)

Astrid Baraona (PhD)

BIOMACHINING

Idoia Postigo (PhD)

Ester Suñen (PhD)

INMUNOLOGY

CONCLUSIONS

- The development of microanalytical platforms is a multidisciplinary action, that often requires: the combination of microfluidics, surface engineering and functional materials.
- The Microfluidics Cluster at the University of the Basque Country is building a multidisciplinary team for the development of microsystems. Strong focus on commercialisation.
- Two major fields of application of the analytical microsystems are: rapid analysis of fluids and cell monitoring platforms for short or long term analysis. Both can benefit from the integration of sensors into microfluidic networks.