Matching Technologies and Opportunities

MATEO

North East SOUTH West
INTERREG IIIC

PROJECT PART-FINANCED BY THE EUROPEAN UNION

Generalitat de Catalunya
CIDEM

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RegioneLombardia

Provincie Noord-Brabant

FlashPoM

Industrial development and technology transfer of a **low-cost low lead-time production service of prototype microdevices** for SMEs in the analytical chemistry and biomedical markets.

Alessandro Formenti - 31/10/07

European partners

North-Brabant
- Technische Universiteit Eindhoven
- Dolphys Medical B.V. (SME)

Lombardia
- Università di Milano
- Tethis Srl (SME)

South-West Bohemia
- University of West Bohemia

Catalonia
- Universitat Politècnica de Catalunya
- Aleria microtechnologies (SME)

PoM combines **Po**lymeric microfluidic structures and solid substrates with embedded **M**ultielectrode arrays

Performed activities

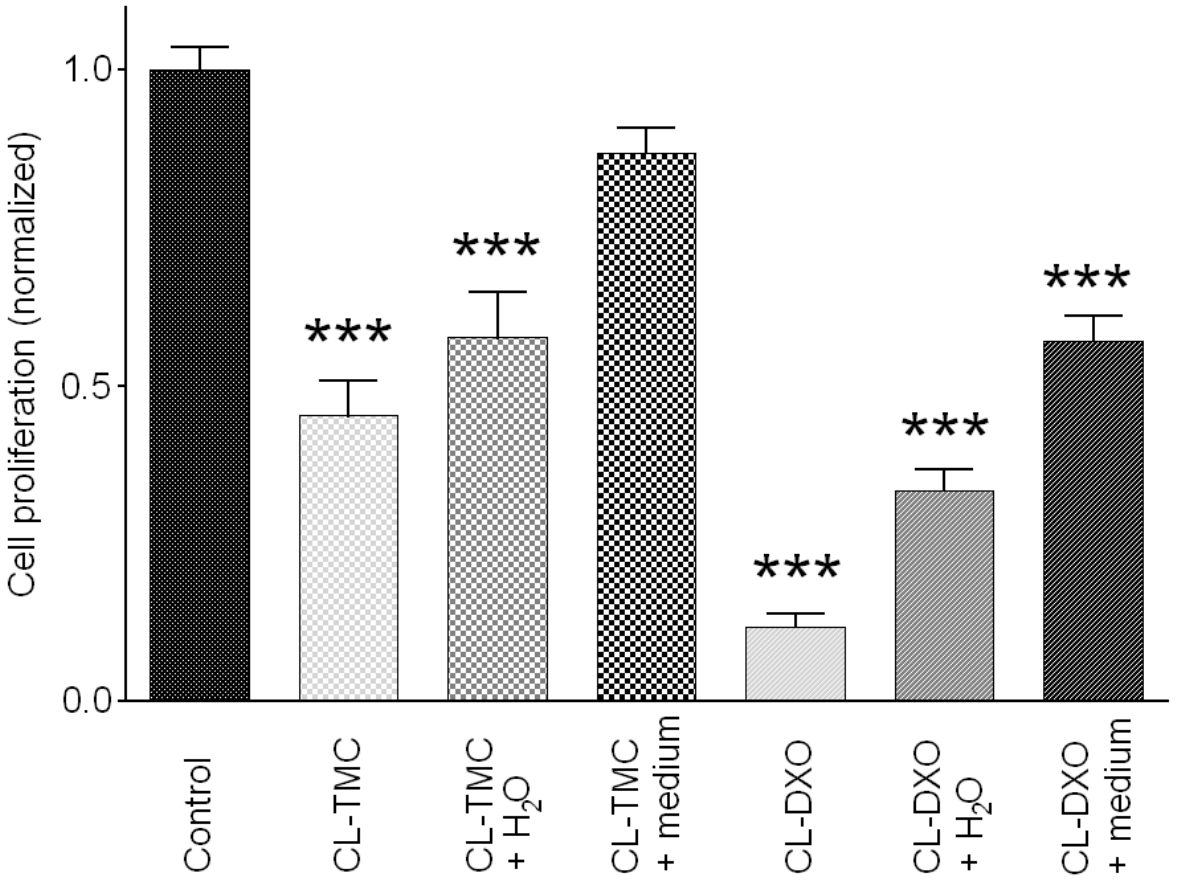
- Assembly and thorough test of a laser-based system for production of soft-lithography masters
- Windows software to support low-complexity design of customised chips
- Testing of the polymers used for compatibility with neural stem cell propagation and differentiation
- Optimisation of the polymers involved in chip production.

Copolymers

PoM devices require the use of polymeric substrates that are **photocurable** (for laser-writing), **amorphous** (for transparency), **biocompatible** with cells and relatively **stable** against hydrolysis.

These requirements have been met with **diol-initiated random copolymers of ε-caprolactone (CL)** with either 1,5-dioxepan-2-one (DXO) or trimethylenecarbonate (TMC). These low molecular weight amorphous copolymers have been functionalized with acrylate end-groups, enabling the preparation of UV-cured films with a high cross-link density.

Proliferation of the neural stem cells in presence of the co-polymers CL-TMC and CL-DXO and following polymer conditioning in distilled water or culture medium



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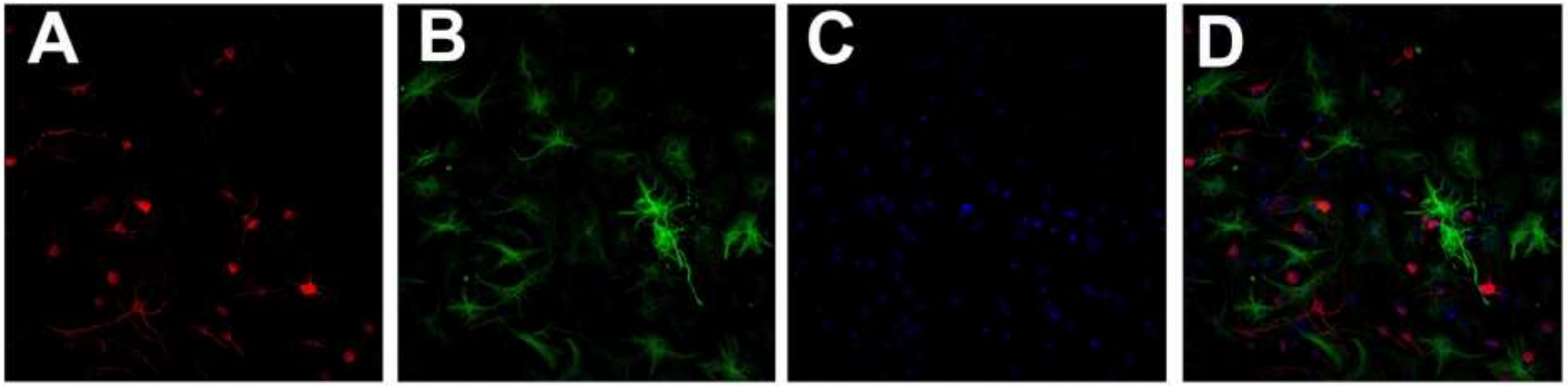
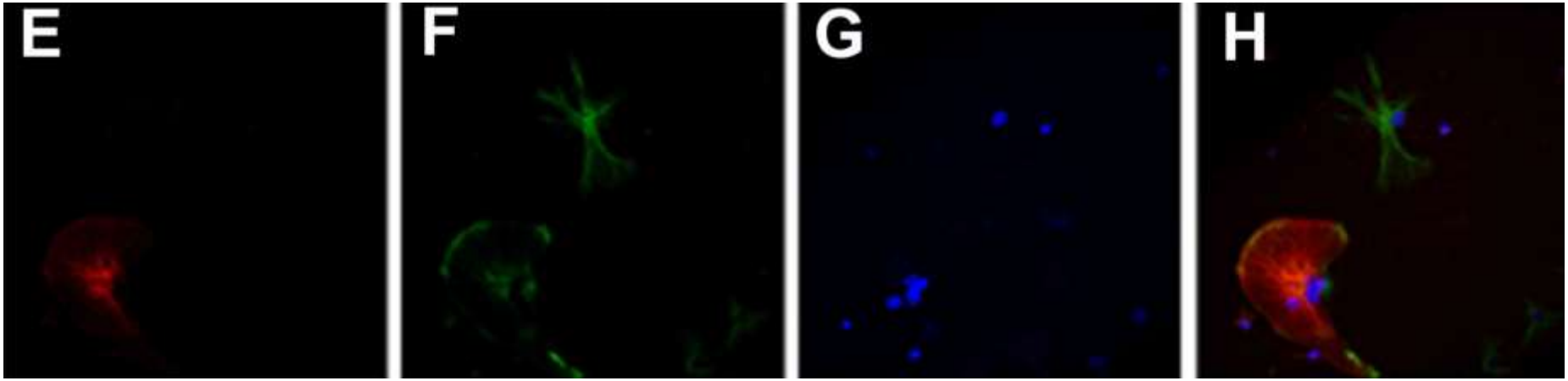
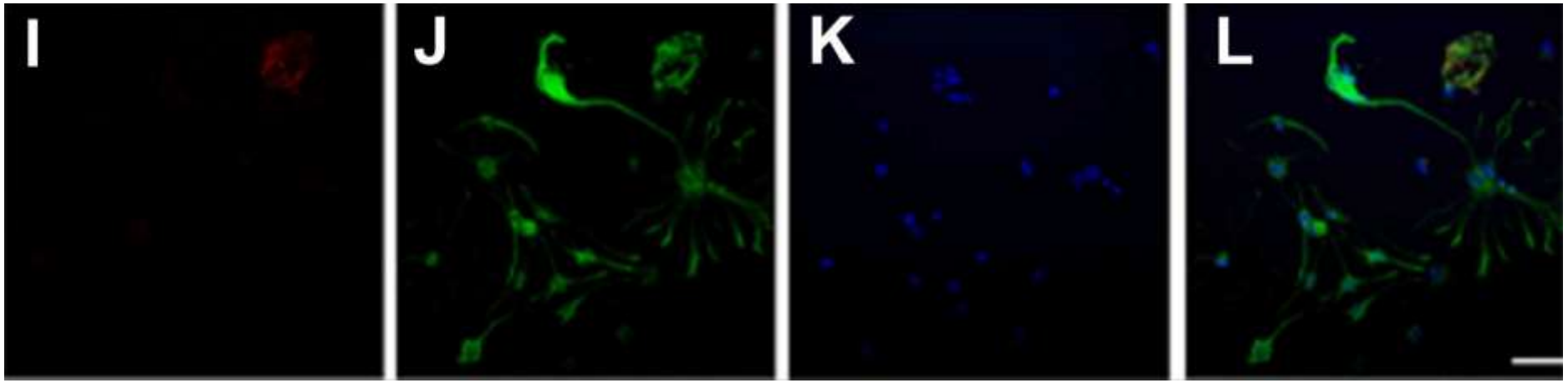
Neural stem cell differentiation in control conditions



Neural stem cell differentiation on the surface of CL-TMC co-polymer



Neural stem cell differentiation on the surface of CL-DXO co-polymer



PoM electronic interface

Who and how can utilize these results? What competitive advantage is offered by FlashPoM to SMEs

- **FlashPoM offers a low-cost low lead-time production technology for** customised **lab-on-a-chip** devices (PoM) supporting the study of neuronal activity in vitro, both for basic research into a variety of neurological diseases as well as for the development of novel therapies.
- **FlashPoM is available for SMEs** in the analytical chemistry and biomedical markets and public and private research laboratories.

Further developments:

- A continuation of the project is under evaluation. Sources of funding, both from public and private entities, are being sought.

New perspectives:

- PoMs as cell factories for neural stem cells with the advantage of real-time information about the degree of stem cell differentiation to functionally mature and excitable neurons. This original device may be of great impact on neural stem cell transplants
- Polymers as scaffolds for neural stem cells in transplants to repair nervous system lesions

UNIVERSITÀ DEGLI STUDI DI MILANO

Participants at the University of Milan

Dip. di Medicina, Chirurgia e Odontoiatria Ospedale S.Paolo

- **Alfredo Gorio (local coordinator)**
- **Anna Maria Di Giulio**
- **Daniele Bottai**
- **Raffaella Adami**
- **Daniela Cigognini**

Dip. di Tecnologie dell'Informazione (Crema)

- **Rita Pizzi**
- **Danilo Rossetti**

Ist. Fisiologia Umana II

- **Alessandro Formenti**
- **Carmelo Bellardita**
- **Francesco Bolzoni**
- **Emiliano Ripamonti**
- **Melissa Sorosina**