SCIENCESPRINGDAY

FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

Materials Science Department

Microfluidic devices for biosensors

CEMOP / I3N
Microelectronics and Optoelectronics Group

Iwona Bernacka-Wojcik

Student

2008 – present, PhD student, UNL
2007 – MSc in Materials Science, Jagiellonian University

ib@uninova.pt

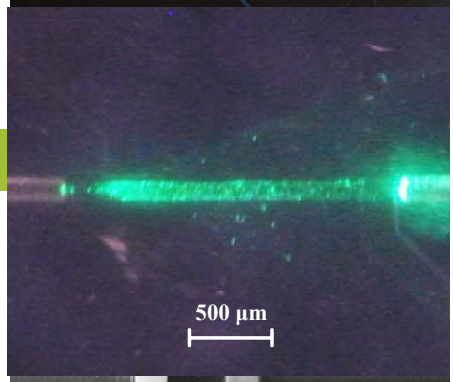
Objectives

Design, fabrication and testing of:

- microfluidic device for colorimetric DNA detection based on DNA functionalized gold nanoparticles;

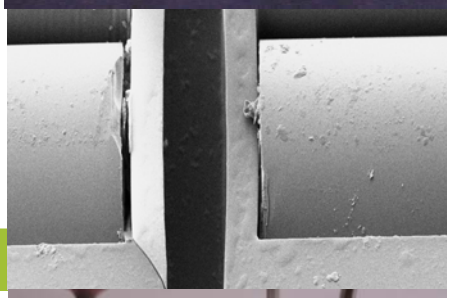
- microfluidic device for simultaneous measurement of the refractive index and absorption properties and electrical properties of solutions / cells;

- micromixer for fast and efficient mixing of fluids.



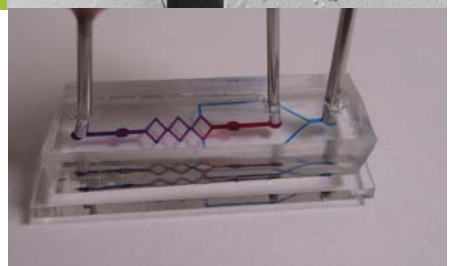
Methodology

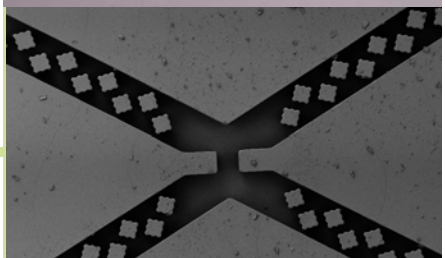
The microfluidic device are fabricated using replica moulding technology in PDMS patterned by high-aspect-ratio SU-8 moulds. The light is guided to the microchannel by the optical fibres that are self-aligned by the insertion grooves in the chip. Biochips of various geometries are tested and evaluated in order to find out the most efficient architecture.
A passive mixer is being developed that is a combination of a rhombic mixer with diamond-shaped obstructions within the microchannel. The micromixer design merges chaotic advection achieved by inserting obstacles (diamonds) in the channel with split and recombined streams by adopting a rhombic pattern for the channels.



Expected Results

Once these microfluidic devices will be constructed, characterised and optimised, they will be applied for:
- the detection of a specific DNA target sequence capable of unequivocal identification of M*ycobacterium tuberculosis* members;
- mixing of fluids at microscale;
- analysis of absorption properties and refractive index of reference solutions and cells;
- simultaneous analysis of optical and electrical properties of reference solutions and cells.





Funding:
FCT Fundação para a Ciência e a Tecnologia