Laboratory of microsensor structures and electronics/LMSE/
Faculty of Electrical Engineering, University of Ljubljana (FE UL)

In this contribution, we report about some recent activities related to microfluidic structures that were partly promoted also through MINOS information, in Laboratory of microsensor structures and electronics/LMSE/, Faculty of Electrical Engineering, University of Ljubljana (FE UL), Slovenia.

Microfluidics from LMSE - In the field of microfluidic structures, we have recently designed and realized various microchannel structures by wet and dry micromachining of silicon. Silicon wafer with various fabricated microchannel structures is shown on Fig.1. We have also designed and fabricated Pyrex glass microchannels cover with inlet/outlet microholes, microaligned and anodically bonded on the silicon wafer. An appropriate microfluidic chip housing, essential for proper microfluidic system operation, was also designed and fabricated, enabling fluid connections etc (Fig.2). On the back of the microfluidic chip, for temperature control, a Pt heater and temperature sensors were designed and realised.

Fig.1. Silicon wafer with microchannel structures

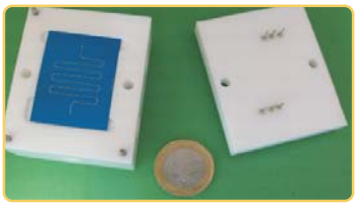

Fig.2. Microfluidic chip with housing

Micro/nano Structures by RIE from LMSE - In the field of silicon micro/nano structures, we have recently designed and realized various micro/nano structures by dry micromachining of silicon. Etching was performed by plasma RIE dry etching of Si with O_2, CHF_3, SF_6 process gases chemistry. Masking layer was in this case silicon thermal oxide paterned by resist photolithography. Processed silicon wafer with various fabricated silicon microstructures is shown on Fig.3.

We have also designed and fabricated sharp tips Fig.4 with small radius of curvature in the range of several tens of nanometers, for applications in Field Emission Devices such as AFM(Atomic Force Microscopy), FED(Field Emission Displays), micrielectrodes for medical applications etc.

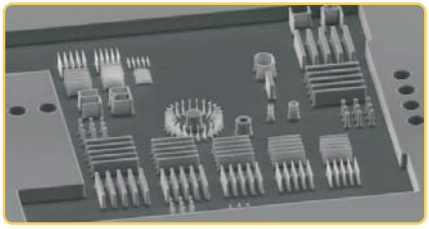

Fig.3. Microstructures realised by RIE dry anisotropic etching in LMSE

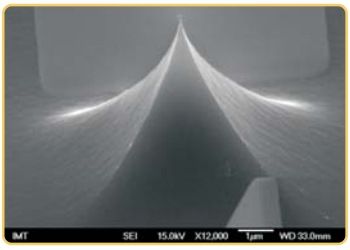

Fig.4. Nanotip realised by RIE dry isotropic etching in LMSE

Contact: **LMSE, Head: Prof.dr. Slavko Amon; Faculty of Electrical Engineering, University of Ljubljana (FE UL)**

Department of Fibres and Textile Chemistry
Institute of Polymer Materials, Faculty of Chemical and Food Technology

Preparation and properties of synthetic polymers and fibres containing additives on micro- and nano-level

Department of Fibres and Textile Chemistry deals with the education of specialists for fibre and textile branches since 1951 and at the same time took part in the national and European research projects in chemistry and technology of fibres and textile materials. *The staff formed by one full professor, 3 associate professors, 2 research fellows and 7 PhD students have participated in the several projects focused to the development of the new types of fibres.*

The Department has the infrastructure of apparatus and equipments and good experience with characterization of fibre-forming polymers, effect of spinning conditions on formation of the structure of fibres as well as with evaluation of their properties. *Department has a collaboration with universities, research institutes and industrial companies in Europe, which was applied in cooperation in two international projects in the framework of 6 FP EU (Biocelsol and Nanohybrid) and several national projects.*

Department is equipped with **two laboratory** spinning plants for synthetic fibres (extruders with screw diameters 16 and 30mm) and with twin-screw extruder (d=20mm) for preparation of polymer blends and composites. Other devices used are: extruder Göttfert, Rheometer Physica MCR 101, plastometers, rotation viscosimeter, TG analyser, DSC 7-Perkin Elmer, thermo-mechanical analyser TMA 50, tensile tester Instron 3343 for testing of mechanical properties, Rheovibron, microscopes, apparatus for dyeing, printing and finishing of textiles.

Department of Fibres and Textile Chemistry will assure all **research works joint with development of nanoparticles dispersions in polymers,** evaluation of the effect of deformation gradients in spinning and drawing on formation of the structure of fibres and properties. In these domains Department has many year experience in cooperation with research and industrial partners such as *Research Institute for Man-Made Fibres, SK, VÚTCH-Chemitex, SK, University Freiburg, D, Technical University of Liberec, CZ, Spolsin, CZ, University of Bielsko-Biala, PL, University of Zagreb, HR, Institute of Chemical Fibres and Biopolymers Lodz, PL*

The **research** at the Department has been focused on the **following topics**:

- pigmentation of synthetic fibres in mass, fibres based on polymer blends, composite and nanocomposite fibres, synthetic fibres modified with copolyamides and organoclays, fibres based on metallocene polyolefins, surface functionalization of synthetic fibres and chemical fibres based on enzyme treated cellulose.

The new methods for evaluation of processing of fibres, their mechanical, thermal, electrical and UV barrier properties as well as light stability are developed at the Department.

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