

### **Project 3.9 Microfluidic methods for leukemia diagnostics using stimulated Raman spectroscopy (SRS)**

**Supervisor:** dr Ladislav Derzi / prof. dr hab. Piotr Garstecki

**Institute:** of Physical Chemistry

**Unit:** Research group No. 11. Microfluidics and Complex Fluids Research Group - prof. dr hab. Piotr Garstecki

**www:** <https://ichf.edu.pl/zespoly/mikroprzeplywy-i-plyny-zlozone>

#### **Background:**

Leukemias are malignancies originating from hematopoietic or lymphoid precursors. They are caused by genetic lesions leading to biochemical, proteomic and metabolomics abnormalities. Current leukaemia diagnostics is based on genetic and phenotypic characterization of these changes. The RAPID project aims to develop the first microfluidic system coupled with a stimulated Raman scattering (SRS) microscope for non-invasive imaging of live cells and apply it to rapid leukaemia cell imaging, diagnostics and sorting. The project is realized within a consortium of 6 research institutes, where integrating the multidisciplinary expertise from a broad range of fields, consortium partners will enable to collect and characterize Raman spectra of leukemic cells and link them to clinico-biological features of the disease. Our team at the Group of Microfluidics and Complex Fluids is responsible for developing innovative microfluidic devices allowing for SRS detection followed by sorting sub-clones of leukaemic cells and testing their chemoresistance in the RAPID system.

#### **Aim:**

The goal of the PhD project is i) develop microfluidic devices allowing for automated SRS detection and sorting, ii) study the behaviour of white blood cells within the microchannels and link the change of environmental factors to physicochemical, morphological and/or biochemical responses facilitating the SRS-based classification and sorting and finally iii) to develop microfluidic devices for chemotaxis assays on the sorted cells.

#### **Requirements:**

- MSc diploma in physics, chemistry, biotechnology, microbiology, engineering or similar,
- creativity and enthusiasm measured by the quality and number of projects, study record, internships, authorship in peer-reviewed publications and patents in which the Candidate participated and contributed,
- analytical thinking and critical problem solving skills,
- excellent communications, organization and time management skills,
- fluent in spoken and written English,
- flexibility and ability to work in a multidisciplinary and multicultural research team,
- direct experience with microfluidics, Raman spectroscopy and/or leukemia cells is an asset