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Postdoc in the AdaptoCell project at MAX IV Laboratory. We are developing microfluidic platforms for X-ray studies of liquid samples under flow, and in this presentation we would like to share our latest results.

AdaptoCell – Microfluidic Platforms at MAX IV Laboratory

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In the AdaptoCell project[1] we are developing microfluidic platforms for X-ray studies of liquid samples. Microfluidics is a suitable technology for samples that are prone to radiation damage such as proteins. By having the sample under flow, the sample is continuously refreshed, and the risk of radiation damage is reduced. The technology is also suitable for investigating dynamic events such as in situ mixing. The microfluidic platforms are being integrated at three beamlines at MAX IV Laboratory: Balder (X-ray absorption/emission spectroscopy) CoSAXS (small angle x-ray scattering) and MicroMAX (serial synchrotron crystallography). Currently, the platforms are available for users at Balder and CoSAXS, and it is under development at MicroMAX. In addition, we also provide a microfluidic off-line test station where users can test their samples and optimise their devices before the beam time.

The main components of the microfluidic setup are the pressure driven flow controller and the microfluidic chip. We are mainly using commercially available polymer microfluidic chips made of COC (cyclic olefin copolymer). COC is used as chip material as it has high X-ray transmission and high resistance to radiation damage. There are several different chip designs available such as straight channel chips, droplet generator chips and mixing chips.

We believe that the AdaptoCell platforms will be useful and versatile sample environments for academic and industrial users at MAX IV Laboratory who want to perform experiments with liquid samples under flow.

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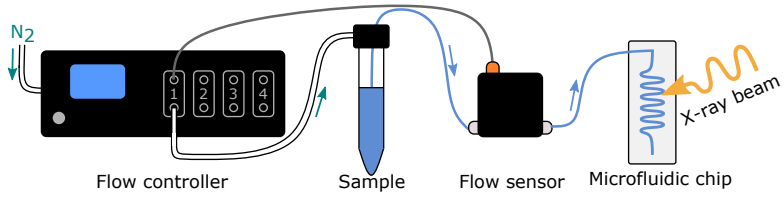

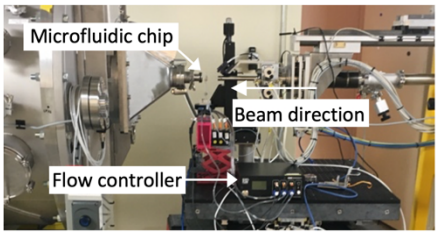

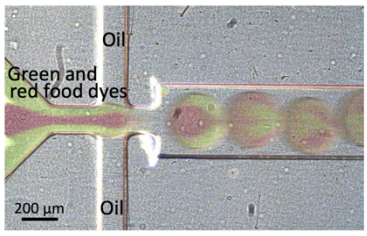

Upper: Schematic of the microfluidic setup with the pressure driven flow controller. Lower left: A microfluidic experiment at CoSAXS. Lower right: An example of a droplet generator chip. In the droplets the green and red food dyes are mixed rapidly due to the internal flow streams within the droplets.