

2ND INTERNATIONAL MICROFLUIDICS CONGRESS

May 23-24, 2019 | Las Vegas, USA

The development of a picolitre sample delivery system for XFEL time resolved studies

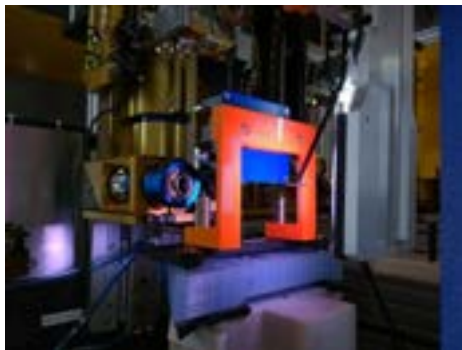
Peter Docker¹ and Gabriel Leen²

¹Diamond Light Source, UK

²Polypico, Ireland

This paper describes new and exciting applications for a technology developed by Poly Pico Ltd. We describe how this picolitre sample handling system is being developed for time resolved picolitre protein crystallography investigations. The studies are planned for LCLS II at Stanford University and the European XFEL in Hamburg. The standard Poly Pico system can deliver discreet droplets of fluid or in our case, fluid containing nano dimensional protein crystals at a rate up to 10KHz. The system currently being developed will deliver at a rate up to 50KHz and can be externally triggered so sample can be delivered when pulses of X rays are present and timed with the detector rate. Current sample delivery systems deliver a jet of protein crystals continuously and data collection is only a few percent from the total crystals supplied. Our new approach is even more important when using X-rays at the European XFEL as their X-rays are delivered with an unusual time structure. The beam has a repeating signature repeating every 10HZ. It is off for 98% of the time and then delivers up to 2700 pulses before going dark again. These discrete pulses are ideally positioned

to study chemistry reactions in real time. For clarity, the Pico system could use 16 of these tightly packed pulses, the only system in the world capable of doing so. The Poly Pico system almost eliminates the sample wastage that is synonymous with continuous jetting. Other developments will also be described including temperature control for delivering viscous material and alignment using electro-steering.



Biography

Peter Docker holds the position of Senior Engineer at the Diamond light source the UK's synchrotron. He has 19 years' experience in micro, nano and pico device and sample handling systems. His current position involves developing such systems for sample delivery for X-ray interrogation.

Peter.docker@Diamond.ac.uk