

Bright Lights and Tiny Chips

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This project consisted of a series of experiments designed to test and contrast the suitability of a Silicon/Glass chip and a polymer chip for performing X-ray analysis on samples in solution.

In other words, chips about the size of a microscope slide were produced with a very thin channel running through them. This channel was just over the width of a human hair. It was used to flow liquid versions of samples through it. The samples needed to be flowing to keep them fresh.

The reason to have a channel so small is twofold. Firstly the samples that were tested needed to be used as little as possible. Secondly, when a fluid flows along very small channels it moves in an even and predictable way called laminar flow. This is very useful to investigate the properties of fluid samples.

The chips were intended for X-ray absorption experiments. They use a very bright beam of light produced at the MAX IV laboratory. Light is shined on the flowing samples, whatever bounces back is measured, and from this, information can be gathered.



Basic flow tests were carried out on the chips involving pushing a small amount of water through them and checking that all connections were strong. X-ray tests were performed after this to check the chips suitability for use in X-ray based analysis. A salt solution, $FeCl_3$, was flowed through each device.

Finally, the strengths and weaknesses of each chip were compared based on how they performed in the tests, how they interacted with the samples and X-rays, and ideas for how the project could be progressed were discussed.