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R. Haider, B. Marmiroli, I. Gavalas, M. Wolf, M. Matteucci, R. Taboryski, A. Boisen, E. Stratakis, H. Amenitsch



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## Laser Ablation and Injection Moulding as Techniques for Producing Micro Channels Compatible with Small Angle X-Ray Scattering

R. Haider<sup>1</sup>, B. Marmiroli<sup>1</sup>, I. Gavalas<sup>2</sup>, M Wolf<sup>1</sup>, M. Matteucci<sup>3</sup>, R. Taboryski<sup>3</sup>, A. Boisen<sup>3</sup>, E. Stratakis<sup>2</sup> and H. Amenitsch<sup>1</sup>

<sup>1</sup>Graz University of Technology, Institute of Inorganic Chemistry, Stremayrgasse 9/IV, 8010 Graz, Austria

<sup>2</sup>Institute of Electronic Structure and Lasers, Foundation for Research and Technology and University Of Crete, Department of Materials Science and Technology 100 Nikolaou Plastira Str. Vassilika Vouton Heraklion Crete GR-700 13, Greece

<sup>3</sup>DTU Nanotech, Technical University of Denmark, Department of Micro- and Nanotechnology, Ørsted's Plads, Building 345C, Building 423, 2800 Kgs. Lyngby, Denmark

e-mail: richard.haider@tugraz.at

Microfluidic mixing is an important means for *in-situ* sample preparation and handling while Small Angle X-Ray Scattering (SAXS) is a proven tool for characterising (macro-)molecular structures. In combination those two techniques enable investigations of fast reactions with high time resolution (<1 ms).

The goal of combining a micro mixer with SAXS, however, puts constraints on the materials and production methods used in the device fabrication. The measurement channel of the mixer needs good x-ray transparency and a low scattering background. While both depend on the material used, the requirement for low scattering especially limits the techniques suitable for producing the mixer, as the fabrication process can induce molecular orientations and stresses that can adversely influence the scattering signal.

Not only is it important to find a production method that results in a device with low background scattering, but it also has to be versatile enough to produce appropriate mixer designs.

Here we discuss two methods – laser ablation of polycarbonate and injection moulding of Topas – which were found suitable for our needs, provided care is taken in aligning the mixing/reaction channel, where the actual measurements will be carried out. We find injection moulding to be the better of the two methods.

Keywords: Laser Ablation; Polycarbonate; Injection Moulding; Topas; Micro Channels; Small Angle X-Ray Scattering

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