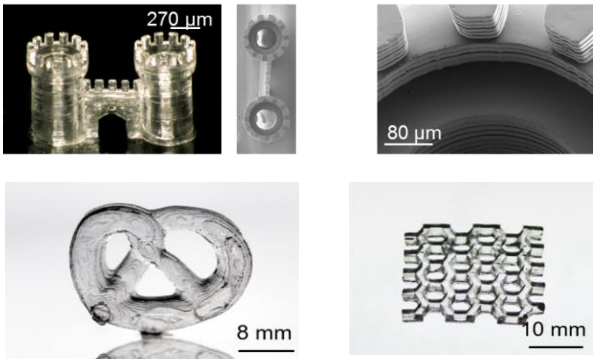
Bachelor Thesis (2018-2019)

Development of new glass 3D printing nanocomposites

Description of the work:



3D printers for the production of macroscopic components are already familiar to many people from everyday life. A major problem for these systems is the limited choice of materials. Many materials that are relevant for life sciences and medical technology can not be processed yet. At the Department of Microsystems Engineering – IMTEK, a novel 3D printer based on maskless micro stereolithography is currently being developed. With this system, new materials such as e.g. Glass, ceramics or highly fluorinated polymers for rapid prototyping in microsystems technology can be harnessed. With the "Liquid Glass" process developed in the working group, pure quartz glass can be printed in various rapid prototyping processes (see pictures).

Within the scope of this thesis, the 3D printing of glasses is to be further developed. New nanocomposites will be produced by means of various metal oxide nanopowders and the synthesized composites will be characterized using a rheometer . These new nanocomposites are to be optimized in terms of filling level and flowability for use in the 3D printer. Following 3D printing, the produced glasses are characterized by suitable analysis methods.

The work will contain:

1.) Use of various commercial available metal oxide nanopowders for the integration into the glass nanocomposites for 3D printing of glasses.
2.) Characterization of the flow behavior of the produced nanocomposites.
3.) Development of suitable sintering protocols as well as the characterization of the 3D printed glasses.

Field of study: organic chemistry, material science

Qualification: Interest in practical work and in interdisciplinary work between engineering and chemistry. Fundamentals of organic and inorganic chemistry are required.

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