Highly Porous Materials by Non-Conventional Sol-Gel Precursors and Processes

Nicola Hüsing, Paris-Lodron University of Salzburg, Department of Chemistry and Physics of Materials, Salzburg, Austria

Highly porous materials are of interest for a variety of applications, e.g. heat insulation, or separation science to name just two very prominent examples. A deliberate control over the pore architecture including pore sizes, pore connectivity and tortuosity as well as pore shape is in many cases a prerequisite for their applicability, however often difficult to achieve in a laboratory.[1] Simple and general methods to prepare (functional and/or monolithic) materials with well-controlled pore architectures, composition and surface functionality are therefore highly desired.

In this presentation, sol-gel processing towards highly porous monoliths by using non-conventional sol-gel precursors will be presented. This includes the application of glycolated precursors, such as tetrakis(2-hydroxyethyl)orthosilicate and the corresponding organoglycoxysilanes, as well as a discussion of the advantages but also challenges resulting from substitution of the alkoxy groups by glycoxy moieties.2 We will also discuss whether this concept is transferable to (transition) metals, e.g. glycolated titanium or aluminum precursors. In addition, the synthesis of organic porous monoliths by applying wood-derived precursor molecules, such as mimosa tannins, as a non-conventional precursor molecule will be presented.

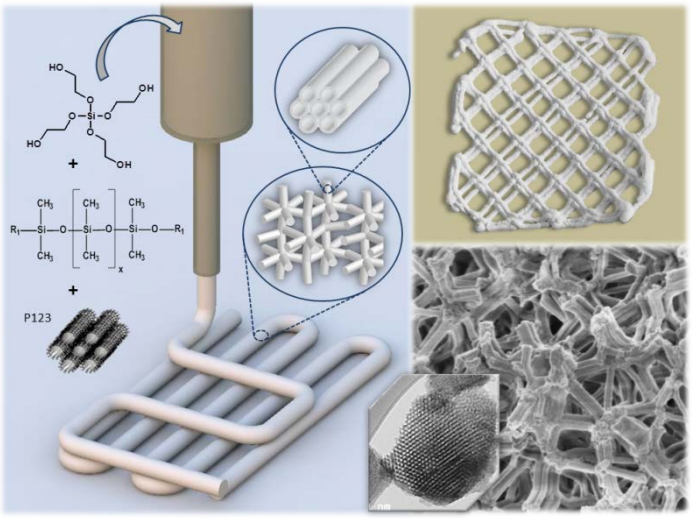

Figure 1. Schematic illustration of the synthesis route towards 3D printed hierarchically structured silica using a glycolated silanes.

References

1. A. Feinle, M.E. Elsässer, N. Hüsing, *Chem. Soc. Rev.* **2016**, *45*, 3377.
2. F. Putz, S. Scherer, M. Ober, R. Morak, O. Paris, N. Hüsing, *Adv. Mater. Technol.* **2018**, *3*, 1800060.