Jennie Von Seckendorff et al., Int J Adv Technol 2018, Volume 9
DOI: 10.4172/0976-4860-C1-002



## Shape matters: Benefits of 3D printing for the design of packed-bed reactors

**Jennie Von Seckendorff**[1,2], **Normen Szesni**[3], **Richard Fischer**[1,2,3] and **Olaf Hinrichsen**[1,2]
[1]Technical University of Munich, Garching, Germany
[2]Catalysis Research Center - Technical University of Munich, Germany
[3]Clariant Produkte (Deutschland) GmbH, Heufeld, Germany

The packed-bed reactor is one of the principal employed reactor types within the chemical industry. In essence, they consist of a long tube either randomly filled with small packing elements or well arranged with structured packing parts. The geometry of the packed parts strongly influences fluid dynamics as well as heat and mass transfer and thus the efficiency of the reactor. However, the currently used production techniques for the packing parts are very limited in terms of achievable shape variability. Therefore, the applicability of 3D printing as a supplementary production method is investigated, as 3D printed parts can be of hardly any imaginable geometry. Shape optimization is performed following a sequence of simulation methods coupling discrete element method with computational fluid dynamics. Inert prototypes can be printed and tested in known testing units to predict efficiency increase. However, printing of catalytically active parts having both significant porosity and sufficient stability is the challenge to be solved in future.

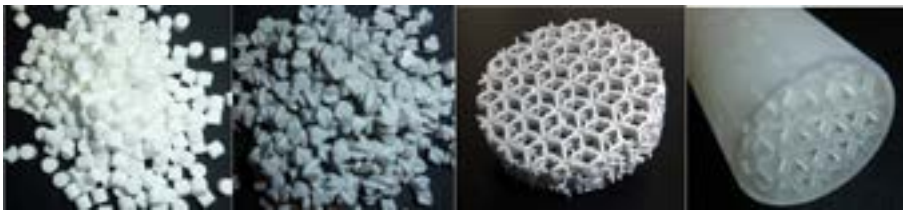

**Figure 1**: *Examples of reactor packings: a) industrially used random packed bed elements; b) printed alternative with more complex shape; c) printed structured packing element; d) printed reactor tube with integrated structured packing.*

### Biography

Jennie Von Seckendorff obtained her BSc and M.Sc Degree in Chemical Engineering at the Technical University of Munich, Germany. She completed a research project at the University of Auckland, New Zealand. She is in the final year of her PhD at the Chair of Technical Chemistry I under Prof. Dr. Ing Olaf Hinrichsen, Technical University of Munich, Germany. Her research interest includes: CFD simulations, design optimization, prototyping, 3D printing of ceramics.

jennie.seckendorff@ch.tum.de

**Notes:**