第429回触媒科学研究所コロキウム

Catalysts scale-up from gram to kilogram; catalytic reactors and microreactors (reactors scale-down)

Prof. Maria Olea

Institute for Catalysis, Hokkaido University;
Teesside University in UK.

2019年12月17日（火）13:00—14:30
Frontier Research in Applied Science Building Seminar
http://www.cat.hokudai.ac.jp/access.html

The development and improvement of processes for the conversion of biomass and waste into energy/fuels and value-added chemicals, via heterogeneous catalysis, is one of the challenges of the 21 st century. Newly-developed catalysts are economically viable only if they can be used in industrial,large-scale, processes. But scaling-up from laboratory-scale experiments to industrial-scale processes is not just the amplification of a new catalytic reaction. Heat and mass transfer must be considered as well, along with the, sometimes, difficult process of shaping the catalyst. Thus, improved modelling, novel reactor geometries and concepts, optimisation of the catalyst's powder shaping process and realistic cost estimates are required. The topic of this seminar is the optimisation of the scale-up process of the SBA-15 supported Ni newly-developed catalysts, on one hand, and on another hand, is the design and modelling of novel reactor geometries, namely microreactors as practical scale-down alternatives to conventional catalytic reactors. The suitability of the shaped catalysts for the tar reforming at industrial scale was assessed by comparing the physical and chemical characterisation results of the powder and shaped catalysts. As for the novel microreactors' design and modelling, results obtained so far will be briefly presented. Certainly, for the industrial applications, the microreactors must be scaled-up, therefore scale-up approaches will be identified and dealt with. Horizontal scale-up (scale-up in parallel or scale-up by multiplication or scale-out or numbering-up) offers one alternative, while vertical scale-up offers another. The latter must account for the effect of equipment scale on the interplay of transport and kinetics while the former keeps the geometry, flow and contacting pattern, and flow regime the same but has to deal with the system integration and flow distribution.

She got Ph.D. from University "Babes-Bolyai"of Cluj-Napoca, Romania(1996);1984-2004; Assistant professor, lecturer and Associate professor : University "Babes-Bolyai" of Cluj-Napoca, Faculty of Chemistry and Chemical Engineering, Department of Physical Chemistry, Romania, Senior Visiting Scientist in Tokyo University and Ghent University 2001-2007; Lecturer and Professor 2007-2019; Professor, Cumbria University 2019-; Professor, Hokkaido University 2019

問合せ先： 触媒科学研究所・朝倉清高（askr@cat.hokudai.ac.jp / 011-706-9113）