

ICB PhD public presentations

PARTICLE SIZE ENGINEERING OF AN INDUSTRIAL ZIEGLER-NATTA CATALYST

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HCI H 2.1, 10.00 h

Project Summary: Studies have shown that for Ziegler-Natta based polyolefin production, catalyst particle size (distribution) plays a determining role for catalyst activity and final product quality attributes. Therefore, more fundamental knowledge on catalyst particle preparation as well as new approaches to control the particle size distribution are of high industrial importance. In this project, the particle formation process of an industrial Ziegler-Natta catalyst was studied in great detail. Through chemical composition analysis and particle size measurements during catalyst preparation, fundamental understanding of the particle formation process was gained. Additionally, an innovative ultrasound-based process was devised in order to reduce the catalyst particle size and increase the catalyst activity. The experimental observations in terms of particle fragmentation and aggregation rates during this process were rationalized using a mathematical model based on population balance equations and the value of the sonofragmentation process for ethylene polymerization was validated through polymerization tests under actual industrial conditions.

CV. Antoine Klaue performed his master thesis in the group of Prof. Dr. Morbidelli and obtained his Master in Chemical and Bioengineering at ETH Zürich in 2013. He subsequently started as a PhD student in the same group in 2014.