E305

Using an acoustic levitator to investigate the drying kinetics and solids forming process of individual droplets during spray drying

Ramona Huelsmann[1], Guenter J. Esper[1], Reinhard Kohlus[2]
[1]University of Applied Sciences, Fulda, Germany
[2]University of Hohenheim, Hohenheim, Germany

Spray drying is a widely used process to turn slurries into dry powders and is especially important for thermally-sensitive materials, that are often found in the food or pharmaceutical industry. However, detailed insight into the drying kinetics during spray drying is difficult to investigate due to the boundary conditions in a spray drying tower. As a result, there is a lack of important information on the drying process and subsequent solidification of individual droplets. In this context, an experimental setup for a droplet positioned in a stationary ultrasonic field of an acoustic levitator was designed to enable a non-contacting measurement of the drying kinetics and the subsequent solidification process. To generate a comparable situation like in a real spray drying process, the droplet is positioned in an airflow, where air temperature, humidity and velocity can be adjusted over wide range. Using an infrared camera to measure the surface temperature and a CMOS camera for object recognition, the droplet can be observed continuously and drying kinetics of the droplet can be determined from the measured surface temperature and decreasing droplet size.

E306

Production of rhamnolipid by fermentor attached with packed bed adsorption column – A step forward towards process intensification

Arijit Nath[1], Iva Anic[1], Pedro Franco[2], Rolf Wichmann[1]
[1]Department of Biochemical and Chemical Engineering, TU Dortmund University, Germany
[2]Department of Bioengineering, Instituto Superior Técnico, Universidade de Lisboa, Portugal

In present investigation, a fermentor attached with an adsorption column has been adopted for microbial production of rhamnolipid. During fermentation process, sufficient sterile air was supplied to the bioreactor for microbial growth as well as to create a large amount of foam. Foam arose up from the bioreactor and passed through the packed bed column. Rhamnolipid was separated from foam by hydrophobic-hydrophobic interaction between hydrophobic part of rhamnolipid molecule and hydrophobic ligand of packing material, when the foam passed through the adsorption column. After sufficient adsorption (saturation level), the adsorption column was rinsed with an adequate amount of sterile fermentation medium and ethanol in a sequential way to recirculate bacteria to the bioreactor and recover the rhamnolipid from packed bed column, respectively. In a laboratory-scale experiment, after 48 hours of fermentation and ex-situ adsorption of rhamnolipid from the foam, 90% out of 5.5 g of total rhamnolipid produced during fermentation were recovered by ethanol elution.