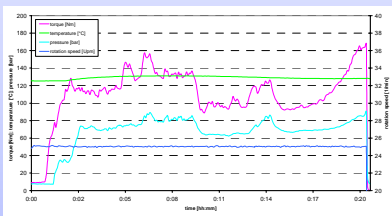


Research for the Optimization of Extrusion Processes

Extrusion processes have become more and more important in the food and pharmaceutical industry, since different process steps like compression, shear, thermal treatment, feed and expansion can simultaneously be performed in a single device.



The inclusion of flavour or active ingredients in a solid matrix by extrusion leads to new intermediate products. Their main advantages are enhanced storage stability, improved processability and actual availability of the included substances in high concentrations.



Measurement of temperature, pressure, rotation speed and torque in processes

Co-rotating-twin-screw-extruder

However, the technological parameters of such extrusion processes are still a matter of trial-and-error approximations based on human experience. Our research is aimed at a more systematic approach based on scientific investigations for some selected materials.



View into the opened extruder showing material in different heat, mix and dispersing zones

Goals:

- Functional correlations between parameters of the process and the matrix composition
- Optimization of the production process in terms of different material, technological and equipment influences

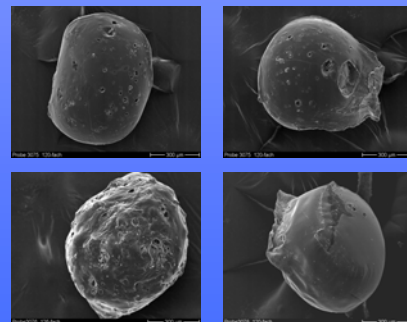
Emphasis of current research:

- Assays for melting of various matrices (temperature for blends, melting and on the die)
- Optimization of the screw configuration and die design
- Analysis of the influence of the process factors in the quality of the encapsulation
- Interaction of included substances with the encapsulation matrix
- Measurement of dynamic aroma release from encapsulated materials
- Barrier design for a controlled flavour release



Assessment of the extrusion processes by evaluation of

- Structure and distribution of the encapsulated compounds within the matrix using scanning electronic microscopy
- Amount of total encapsulated material
- Release kinetics of encapsulate material
- Shape, size and size distribution of the final product using digital image analysis



Scanning electron micrographs of encapsulated flavour particles produced by extrusion