Preparation and characterization of modified inulin particles by spray-drying regarding release behaviour and cytotoxicity

Michael Walz¹*, Monika Bach¹,², Thomas Hirth³, Achim Weber¹,²

¹Institute of Interfacial Process Engineering and Plasma Technology IGVP, University of Stuttgart, Stuttgart, Germany
²Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB, Stuttgart, Germany
³Karlsruhe Institute of Technology KIT, Karlsruhe, Germany

*Michael.Walz@igvp.uni-stuttgart.de

In our work, we investigate the application of carbohydrate based polymers from renewable resources as encapsulation material using the spray-drying technology. Therefore inulin is used as a fructan from the chicory root which has already several biomedical applications, e.g. drug-delivery for colon targeted substances and adjuvants for vaccines. [1] Chemical modifications are applied to adjust the release behaviour of the particles. We investigate the influence of several functional groups towards particle formation and encapsulation of low molecular substances (hydrophobic vs. hydrophilic and solid vs. liquid) such as dexpanthenol or vitamin C via spray-drying as well as the release behaviour. Herein, the modified inulin was characterized by NMR, IR, SEC and DSC. The spray-dried formulations were analysed via SEM and static light scattering methods. Figure 1 shows an example of native and modified inulin particles that were spray-dried with a content of 1 % dexpanthenol. The particles showed a spherical structure with a size range from 0.7 µm to 5 µm. In order to determine the release behaviour, an USP apparatus 4 method with standardized dialysis adapter was used which is suitable for micro particle testing. [2] The release of substances like dexpanthenol or vitamin C were determined in phosphate buffer solutions and quantified via HPLC methods. We investigated and applied different substances regarding the chemical modifications of inulin. To ensure non toxicity of the modified inulin towards organism and cells the the cytotoxicity of the obtained materials according to the DIN EN ISO 10995-5 was investigated.

![Inulin derivates obtained by spray-drying containing 1 % dexpanthenol.](image)

**Figure 1** Inulin derivates obtained by spray-drying containing 1 % dexpanthenol.

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