

NEED AND POTENTIAL OF DIGITALIZATION IN THE DEVELOPMENT AND PRODUCTION OF POLYMERS

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Synthetic polymers are produced to achieve desired application properties tailored to customer needs. Today's environment of rapidly accelerating technological innovation poses the challenge of bringing new products to market even faster. However, since the relationship between application property and polymer structure is not always understood, development of new polymers requires a significant number of iterative cycles. Furthermore, scale-up to industrial scale often needs additional steps.

To that end, there are several tools available which help to more effectively develop products and processes, efficiently transfer them to industrial scale, and to optimize production. Modeling tools in polymer reaction engineering – such as kinetic and thermodynamic modeling coupled with computational fluid dynamics – together with statistical methods play an important role to enable development and scale-up without surprises or variations in final product properties. Furthermore, online monitoring and control facilitates optimization of process conditions as well as product properties such as chemical composition, molecular weight distribution, and morphology.

The implementation of digital tools has become increasingly important to maintain this workflow and expert knowledge in today's dynamic innovation environment. This poster presents examples from an industrial point of view and focuses on the possibilities and needs for digitalization in research and development of the polymer reaction engineering.