Modularization and standardization as key for future chemical production: Status update and further challenges

Andreas Brodhagen, BASF SE, Ludwigshafen; Christian Dreiser, Clariant Produkte GmbH, Frankfurt; Marcus Grünewald, Ruhr Universität Bochum; Olaf Halle, Lanxess Deutschland GmbH, Leverkusen; Norbert Kockmann, TU Dortmund; Stefan Lier, FH Südwestfalen; Dirk Schmalz, Merck KGaA, Darmstadt; Armin Schweiger INVITE GmbH, Leverkusen; Frank Stenger, Evonik Technology & Infrastructure GmbH, Hanau; Leon Urbas, TU Dresden

Today, European´s chemical industry is facing an increasing market competition from outside Europe. In addition, there are demanding market requirements like reduced “time-to-market”, low investment risk for new products and flexibility in production to be successful in chemical industry. To boost the competitiveness of the European chemical industry the European Commission invested jointly with their industrial partners about 100 million euros into research and development programs focusing on advanced manufacturing schemes during the last funding period. Micro reaction technology, resource efficient continuous chemistry, modularization and standardization were key elements of the funded activities. The funded projects propelled not only the understanding of potential chemical and technological solutions for modularized and standardized production plants. By research within the projects and an intensive pre-competitive exchange among the industry partners, the insight into both opportunities and constraints of the technology platform has been measurably improved and is currently continued in a temporary working party at ProcessNet.

The presentation shares key technological learnings and achievements from an industry point of view; it describes penetrable market segments, reviews opportunities and constraints and discusses new options for modularization and standardization in the light of “Industrie 4.0”. However, some technology gaps need to be tackled within the upcoming years to further exploit the flexibility potential that modularization and standardization can offer to future chemical production: Elaboration of the standardization approach and implementing modularized process automation in close cooperation with NAMUR.