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Abstract: **BioCOnversion: Developing new process routes – from CO to polymers**

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Within the BioCOnversion project an international consortium join their high-level, multidisciplinary expertise to develop a process comprising the primary conversion of CO / syngas into an intermediate through gas fermentation and its enzymatic upgrading to a defined plastic precursor. The project, which is funded by the German Federal Ministry of Education and Research (BMBF) for a period of three years, is coordinated by the open innovation cluster CLIB. Furthermore, the knowledge and experience of various academic and industrial partners along the entire value chain, from the supply of process gases from the steel industry, through the development of the biotechnological process, to the potential product buyer, is incorporated into the project (members of the consortium: Bio Base Europe Pilot Plant, Covestro, Fraunhofer IME and Fraunhofer UMSICHT, VITO, nova-Institut, Ruhr University Bochum, RWTH Aachen University, TU Eindhoven, TU Graz, thyssenkrupp Steel Europe, BFI, Wageningen University).

The aim of BioCOnversion is the development and implementation of a sustainable process from CO-containing gases to a defined polymer precursor by evaluating different technologies. These polymer precursors and functional groups are of great industrial interest. So far, these medium chain carbon compounds are produced via petrochemical process routes. The use of renewable resources is an important step towards building a sustainable economy to replace conventional production from fossil fuels. The process in the BioCOnversion project describes the primary conversion of CO/syngas into an intermediate product by gas fermentation and its enzymatic conversion into a defined plastic precursor. In a first project phase, the individual process steps were experimentally tested independently of each other. Now, in the second project phase, the most promising approaches will be combined and the composition of the overall process will be developed step by step. The process performance of the different steps will then be evaluated by techno-economic assessments and life cycle analysis. Based on these results, the overall process will be experimentally validated and further optimised. The final process evaluation will be undertaken from a techno-economic viewpoint along the whole development chain. BioCOnversion unites several innovative providers of conversion and recovery technologies into a powerful consortium covering the entire value chain – producing a high-value building block from a CO-based, climate friendly process.