

Guest editorial

EU FP7 Project CoPIRIDE – towards new production and factory concepts for a sustainable and competitive European chemical industry

This issue of *Green Processing and Synthesis* is mainly dedicated to the results of the large-scale integrated EU FP7 project CoPIRIDE which just ended on 31.08.2013 after 4 years project run time. The project title CoPIRIDE standing for “Combining Process Intensification-driven Manufacture of Microstructured Reactors and Process Design Regarding to Industrial Dimensions and Environment” gives already a first condensed circumscription of the main project contents. The ultimate ambition of CoPIRIDE with a budget of €16.9 million has been to develop a new modular production and factory concept for the chemical industry using adaptable plants with flexible output for intensified processes under consideration of ecological sustainability and economic viability.

All main efforts within CoPIRIDE have been grouped around specific chemical processes as concrete application background. The main chemical processes have been thereby defined and supervised by industrial partners in the project. Finally in all cases piloting activities have been done for demonstrating central project results also above the level of the improvement of the chemical process itself:

- biomass gasification in view of decentralized ammonia production (industry partner: ITI Energy Ltd.)

- biodiesel production (Chemtex Italia srl)
- synthesis of a special polymer in a two-step process, the polymerization itself followed by a hydrogenation reaction (Evonik Industries AG)
- epoxidation of soybean oil (Mythen S.p.A.)

New microstructured reactors brought to production scale and based on mass-manufacturing suited fabrication concepts as well as other process intensification reactors have been seen as one key enabling element in the project. A further important project element has been to move from conventional to improved processing approaches which open up so-called Novel Process Windows enabled by the reactor concepts of the project. Based on but above the level of reactors and processes, new production plant concepts have been pushed forward e.g. by Evonik with its Evotrainer approach as flexible, mobile and low-cost investment plant and tool to reduce time-to-market and by Microinnova Engineering GmbH with its Flow Mini-plant concept. Quite unique to the CoPIRIDE project has been that from the beginning simplified cost analysis and Life Cycle Assessments have been performed to judge different processing/production options as guiding and early-bird decision tool for project works.



The CoPIRIDE project team at Evonik Industries AG site in Marl, Germany during the last General Assembly meeting.

Enabled by the funding of the European Union, the project has brought together an interdisciplinary team from seven European countries with complementary capabilities. In total 16 partner organizations, from small and medium-sized enterprises to large companies, universities and research organizations, have been involved. Aside the above-mentioned partners these have been: Institut für Mikrotechnik Mainz GmbH, acting aside its research and development tasks as coordinator, Wetzel GmbH, Laserzentrum Schorcht GmbH, Friedrich-Schiller Universität Jena, Universität Stuttgart, École Polytechnique Fédérale de Lausanne, Università degli studi di Napoli Federico II, Politecnico di Torino, Åbo Akademi University, University of Newcastle upon Tyne and Technische Universiteit Eindhoven. The latter is now the scientific home of Prof. V. Hessel, initiator and co-coordinator of the project. With him as being also Editor-in-Chief of *Green Processing and Synthesis* not only – as obvious – a perfect match of CoPIRIDE research and results with the scope of the journal which is dedicated in general to innovative and green process development and synthesis is given but also a personal link.

Naturally, the contributions in this issue cannot cover all project aspects. But they allow a good insight in central aspects of the project: Hoang et al. introduce to biodiesel production technologies supplemented by Bensaid et al. reporting about related piloting activities in CoPIRIDE. Process insights are given by Schulze et al. for an anionic polymerization, by Al-Harrasi for a plasma-promoted synthesis step following biomass gasification and by Di Serio et al. to the epoxidation of soybean oil. Microreactor performance and contribution to process intensification is

discussed by Haber et al. The novel manufacturing techniques for microstructured reactors targeting production scale are introduced by Krtschil et al. Finally, the paper from Kralisch et al. explains the holistic, life-cycle based evaluation approach followed in the project to provide multi-criteria decision support for ecological sustainable and economic viable processes.

Taking into account also former CoPIRIDE project publications in this journal including also the laboratory and company profiles of project partners, *Green Processing and Synthesis* emerged as quite extensive compendium for the CoPIRIDE project.

I hope you enjoy the excursion into the CoPIRIDE project provided by this issue of *Green Processing and Synthesis*.



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