

## Flow chemistry activities of the division chemistry at a glance

We are dealing with improving chemical production processes in terms of product properties, efficiency, sustainability, safety and flexibility. In doing so, we focus on process intensification using innovative devices and technologies of micro process engineering and flow chemistry.

Our development services cover the levels reactor, process and plant. We develop, design and manufacture specifically adapted flow reactors. Moreover, we bring in our long-track experience in process development and scale-up to support industrial implementation of our technical solutions mainly for the synthesis of fine chemicals, specialty chemicals and pharmaceuticals.

### In our works we set special focus on

- flow electrochemistry
- flow photochemistry and
- continuous synthesis of reactive intermediates (e.g. organometallic reactive intermediates)

This underlines our ambition to contribute to sustainable chemistry.

Talk to our experts and let's work together on the optimal solution for your application!

### Contact

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Scalable continuous synthesis of  
organometallic reactive intermediates

Organometallics in Flow

## Challenges and chances

Organometallic reagent synthesis, even though it is widely used for C-C bond formation, still exhibits some challenges due to high exothermicities in the formation as well as varying incubation periods due to metal activation.

Here, continuous processing enables a vast improvement in safe and efficient processing due to its superior heat management, the novel process window of a large excess of metal and an in-situ metal activation used in the organometallics' formation.

### Therewith we enable

- improved safety of processes through small reactor hold-up volume
- flexibility in production
- improved product quality due to superior heat management and large metal excess

Furthermore, the same holds true for follow-up reactions immediately consuming the reactive organometallic reagents omitting the need to store or transport them but still ensuring quality assessment in between steps.

### What do we offer to our customers?

Our development efforts focus on the fields of process development and process intensification as well as scale-up to industrially relevant throughputs in a modular and easily scalable approach.

In collaborations you can rely on our broad expertise in process simulation, process development on varying scales, reactor design, and whole system integration.



Save time, money and energy with our flexible and patented technology: safer, more selective and scalable.«



### What are our current development scenarios?

#### Infrastructure @ Fraunhofer IMM

- development and optimization of novel Grignard, Zn, or Li reagent formations are enabled on the laboratory and pilot scale based on innovative reactor technology
- high quality organometallics are produced in flow in on-demand quantities
- follow-up reactions are performed again on the laboratory and pilot scale based on innovative reactor technology
- online analytics such as IR quality control can be integrated

#### Application fields

Our technology is applicable in a variety of industrial manufacturing processes:

- API scouting and production
- crop protection, agrochemicals
- flavors and fragrances
- fine chemicals for other applications

#### Benefits for our customers

- faster time-to-market
- full access to class of organometallics
- on-demand production
- easy scalability
- savings in time and effort for cleaning, switch-over, and work-up