

Dry Coating Process for Battery Electrodes

Environmentally friendly / Cost efficient, space and energy saving

Novel battery production facilities

The fabrication of high-load electrodes is a highly promising approach for increasing the energy density of Li-ion batteries due to a favorable relation of active to inactive materials. However, state-of-the-art tape-casting processes with relatively high solvent contents are limited in terms of coating thickness and drying procedures, accompanied by undesirable effects like e.g. binder migration. Therefore, advanced processes for the electrode production are urgently needed.

Fraunhofer ISIT has developed a dry coating process, which works completely without solvents. The drying of the coated electrode slurry is an energy intensive process. It also requires a large available space because of the long drying sections needed for an optimal process result. With the dry coating process developed by Fraunhofer ISIT, the use of solvents becomes obsolete. Furthermore, higher loadings even exceeding the range of conventional electrodes are possible. This leads to significant cost savings and is more environmentally friendly.

Environmentally friendly manufacture of battery electrodes

- Dry coating technology without solvent consumption implies significant material savings in the electrodes production
- Drastic reduction of the mixing time thanks to adapted dry mixing processes
- Accelerated production process
- Less than a third of the equipment space required compared to conventional solution
- Energy savings in the energy-intensive drying process / elimination of solvent recovery unit

Benchmark of electrodes manufacturing process

	Cost positions	Reference - Casting process	Savings using extrusion process	Savings using novel ISIT dry coating process
Material	Solvent - cathode	NMP	-90% NMP	-100% NMP
Process	Mixing time	0,5 - 2 h	-75%	-80%
Energy	Drying / solvent recovery	6,7 kWh / cell - of which 3,2 kWh for drying	-50%	-80%
Machine - footprint	Total machine length	Depending on drying time	-50%	-70%
Machine - process	Coating speed	35 - 80 m/min	+20%	+/- 10% (post treatment)
	Drying speed	35 - 80 m/min	-50%	
Labour - productivity	Operator cost per machine	Automation level dependant	+25% productivity	+25% productivity
Cost savings - excluding energy consumption	Cathode	Reference	-8%	-13%

Electrochemical Energy Storage Systems for demanding Applications

Fab-SH | Customized batteries made in Northern Germany

What Fab-SH can do for you @Fraunhofer ISIT

Accelerate battery cell development

- Application-specific cell design
- Optimization of cells according to customer experience
- Proof of concept of new cell designs and form factors
- Rapid prototyping of cells and small batch production

Efficient use of resource with battery analytic

- Simulation-based design of system and cooling systems
- Customized systems for new applications
- Prioritization of cell properties
- Qualification from cells to module

Innovative manufacturing technology

- Development of new coating process technologies
- Characterization of new materials and components
- Development of customer-specific recipes for electrodes
- Support for process adoption in production

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