



# High Power Batteries with Extended Lifetime

High rate capability / Cost efficiently / Customized in shape

Modular high power batteries for electromobility developed at ISIT

Lithium-based high-rate batteries are widely used in compact and portable devices where downtimes or unplanned maintenance doesn't translate into financial risks. However, in a growing number of industrial markets, battery storage needs to be built on safe and reliable technologies to offer durability and meet power requirement whatever the weather conditions and over the equipment lifetime.

Ultra-high-performance batteries developed in our Lab, which can be produced with discharge rate up to 60C, can be considered as the game changer in terms of safety, reliability, and performance. Our batteries are built on different cell chemistries (classic, specialized) and find their application in multiple industries.

	Hybrid trains, maritim	Aerospace / electric flying	Tailored to industrial needs
<b>Key attribute &amp; requirements</b>	<ul style="list-style-type: none"> <li>■ Lifetime &gt; 30 years</li> <li>■ Low operating costs</li> <li>■ High uptime</li> </ul>	<ul style="list-style-type: none"> <li>■ Very limited energy mass</li> <li>■ Ideal combination of high power and light cells</li> <li>■ Low overall weight</li> </ul>	<ul style="list-style-type: none"> <li>■ High peak current and power demand</li> <li>■ Versatile format for handheld equipment</li> <li>■ Light weight by design</li> </ul>

## Examples of high-power battery cells

Technical specifications	Battery-electric train	Industrial application	Airborne	Commercially available
<b>Voltage</b>	2,3 V	3,7 V	3,7 V	3,7 V
<b>Energy Density</b>	40 Wh/kg	130 - 170 Wh/kg	Up to 150 Wh/kg	150 Wh/kg
<b>C-Rate*</b>	40-60 C	10 C	15 - 20 C	3 - 8 C
<b>Cycle stability</b>	Over 7000 cycles	2000 cycles	Up to 600 - 1500 cycles	Up to 1000 cycles
<b>Durability</b>	10 - 20 years	5 - 8 years	Up to 10 years	Up to 5 years

\*Number of Charge / discharge cycles per hour (Max. discharge Rate)

High power cell features	Classic	Specialized
<b>Voltage</b>	3,7 V	2,3 V
<b>Energy Density</b>	150 Wh/kg to 400 Wh/l	40 Wh/kg to 130 Wh/l
<b>Power</b>	20 C	60C
<b>Cycle stability</b>	>1000 cycles	>7000 cycles
<b>Durability</b>	8 - 10 years	Up to 20 years
<b>Temperature range</b>	0°C - 60°C	-10°C - 60°C
<b>Capacity</b>	<65 Ah	<20 Ah
<b>Geometry (indicative)</b>	35 cm x 15 cm	35 cm x 15 cm





# 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

## Fraunhofer Institute for Silicon Technology ISIT

Fab-SH | Battery Systems  
Fraunhoferstrasse 2  
25524 Itzehoe, Germany  
[www.isit.fraunhofer.de](http://www.isit.fraunhofer.de)

Battery Systems | Head of  
Cell development  
Raphael Richter

[raphael.richter@isit.fraunhofer.de](mailto:raphael.richter@isit.fraunhofer.de)  
[www.isit.fraunhofer.de/battery](http://www.isit.fraunhofer.de/battery)

