Joint EC/EGCI Workshop EV Batteries

Brussels, April 10th 2013

Pilot Production of Li-Ion-Batteries

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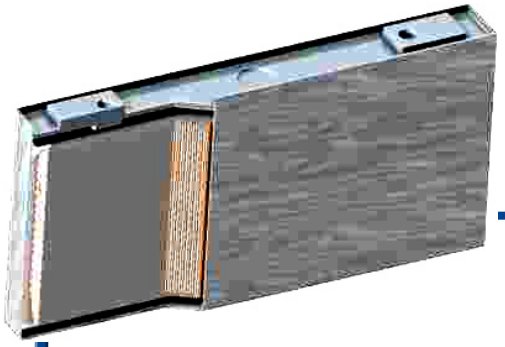
Zentrum für Sonnenenergie- und Wasserstoff-Forschung (ZSW)
Baden-Württemberg

Li-Ion Batteries in Transportation Application



Renault ZOE, Mitsubishi iMIEV, Renault Kangoo rapid z.e.

→ Battery - Drive

Suzuki Swift Plug In Hybrid, Volvo XC60 Plug In, Toyota Prius

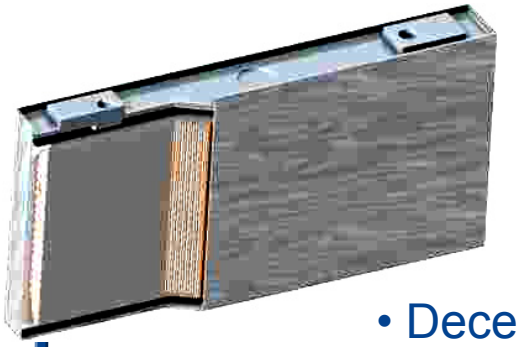
→ Plug In & Range Extender

Audi A6 Hybrid, Audi A3 eTron, B-Klasse F-Cell, Ford Fusion Energy

→ Hybrids

>>> Core Technology for the Majority of Future Drive Trains

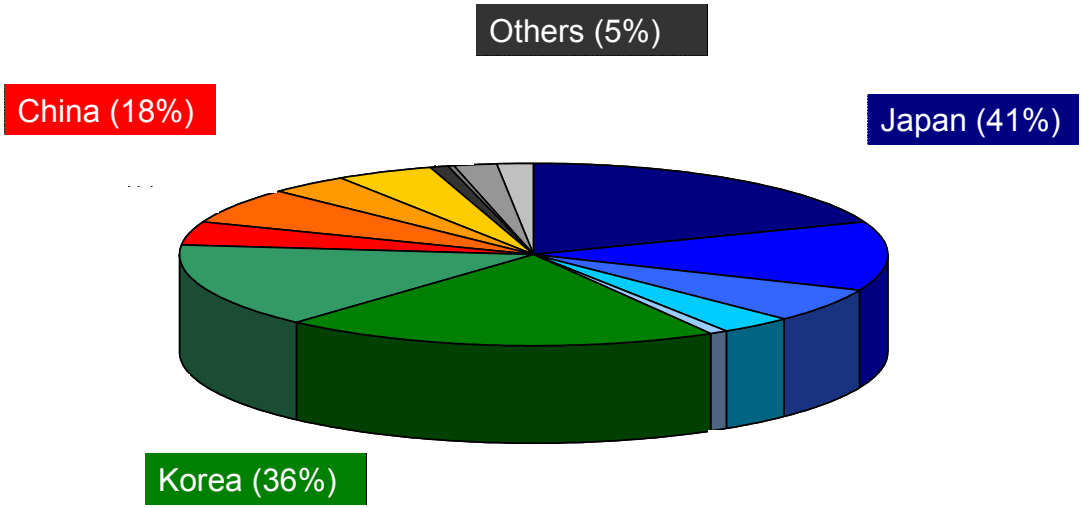
Li-Ion Batteries in Power Supply Markets



- Decentralized Storage of RE
- Grid Independent Power Supply
- Power Quality & Load Levelling
- Emergency Power (UPS)

>>> Core Technology in Future Energy Systems

LiB Battery Manufacturing



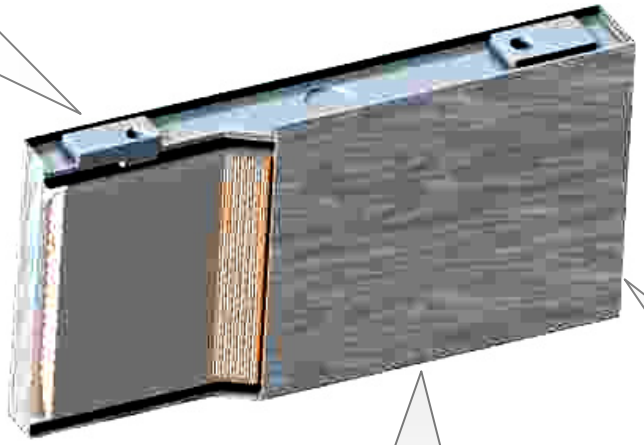
- Today (Consumer Electronics) dominated by Asian Suppliers
- Core Technology for Transportation and Energy Markets (disruptive)
- Important Value Added for many Future Products (Cars, Power Supply)

Competencies Needed
for the Successful Commercialization
of the
LiB - Technology

Competencies Needed

- Material Synthesis & Characterization
- Particle Morphology
- Electrochemical Properties

- Disassembly & Post Mortem Analysis



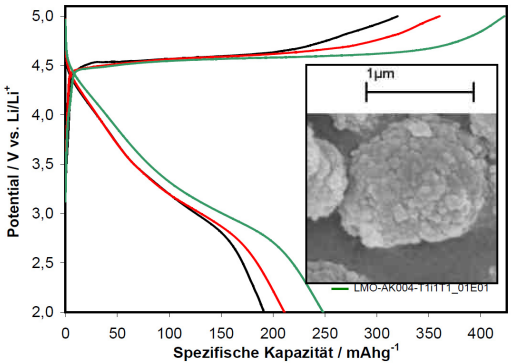
- Slurry Preparation
- Coating Technology

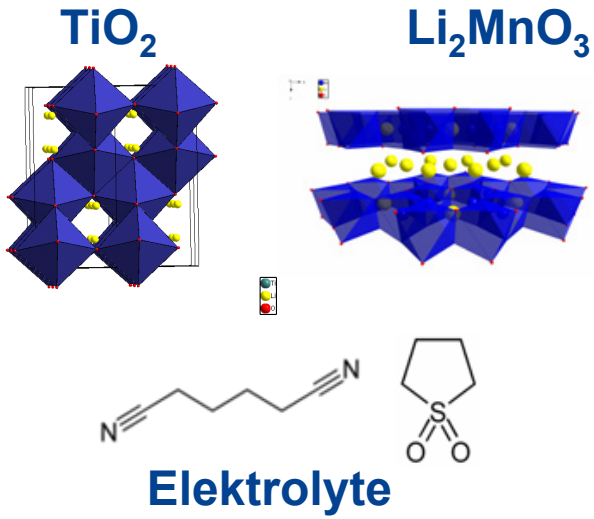
- Performance Testing
- Safety Testing
- Battery Management System

- Cell Design
- Assembly Technologies
- Cell Formation

Competences Needed: Material Synthesis - Particle Morphology - Electrochemistry

- Synthesis of advanced active materials: cathodes – anodes - electrolytes
- Optimization, morphology and particle size
- Characterization & electrochemical properties



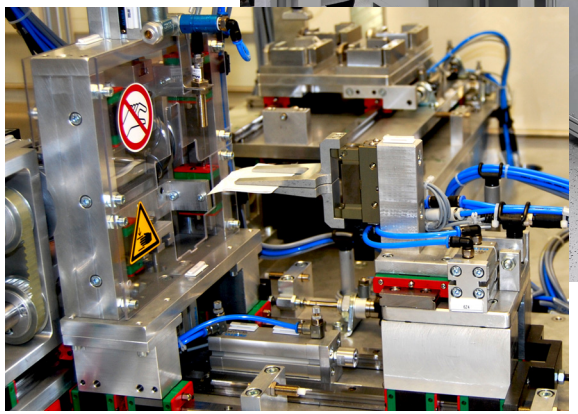


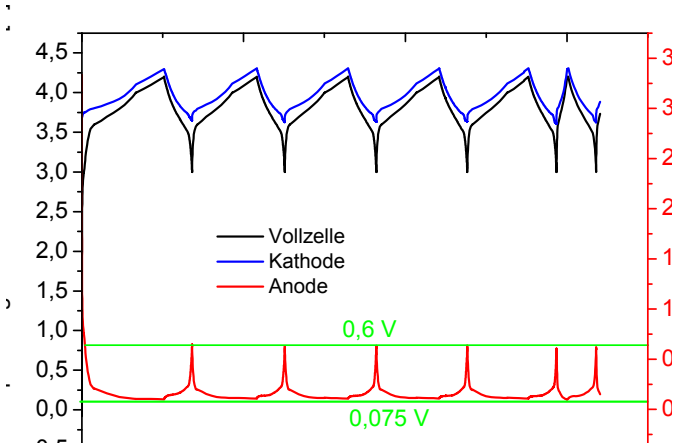
Competences Needed:
Slurry Preparation – Coating Technologies

- Recipe development for electrode slurries
- Homogeneity, rheology and stability of dispersions
- Coating, drying and calendaring with high quality and speed
- Electrode micro structure, porosity and adhesion

Competences Needed: Cell Design - Assembly Technologies – Formation Technologies

- Standard formats (pouch, prismatic, cylindrical)
- Optimized designs and assembly methods
- Automated assembly technologies
- Accurate electrolyte filling & formation





Competences Needed: Performance Testing – Safety Testing – Battery Management System

- Test field for cells, modules and battery systems
- Lifetime and performance testing
- Safety (abuse) test centre
- Battery management system and monitoring technologies
- Mathematical modeling and system engineering

Competences Needed: Disassembly and Post-Mortem Analyses

- Standardized process for cell opening and failure analysis
- Correlation of analysis result and root cause
- Accurate data base for statistics and assessment
- Ageing mechanisms and accelerated ageing methods

Workstations for cell opening

Disassembled pouch cell

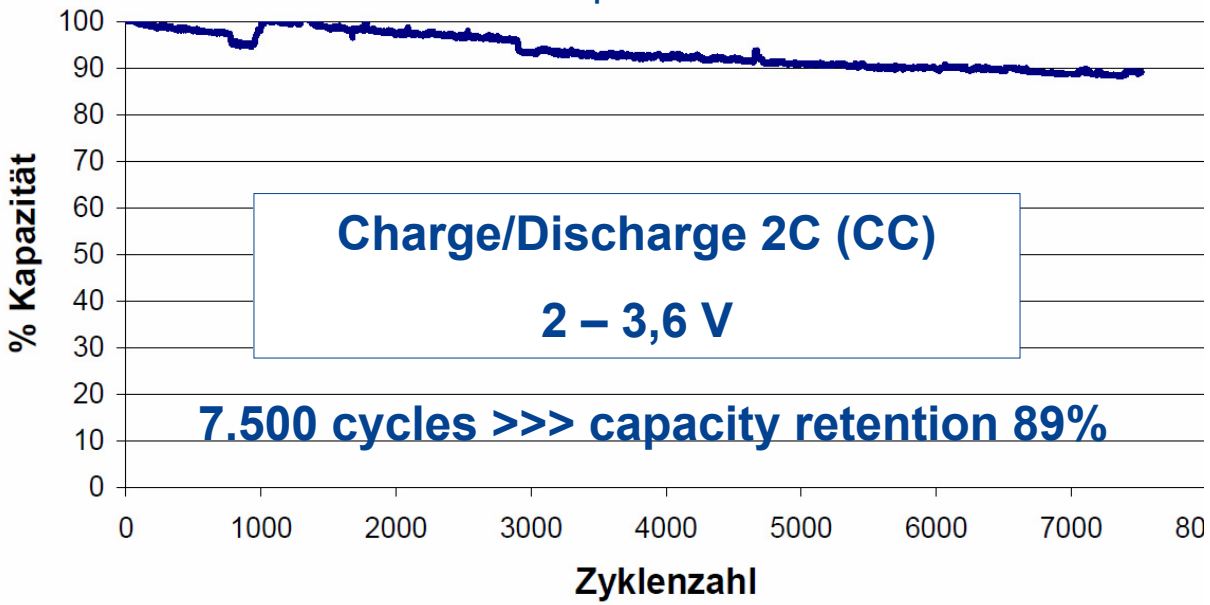
Li-Plating on anode

Achievements based on these Competencies

Standard Cells made by ZSW

e.g.: 700 mAh 18650 ZSW Cell

LFP/Amorphous carbon



Next Step:

Production Technology (Industrial)

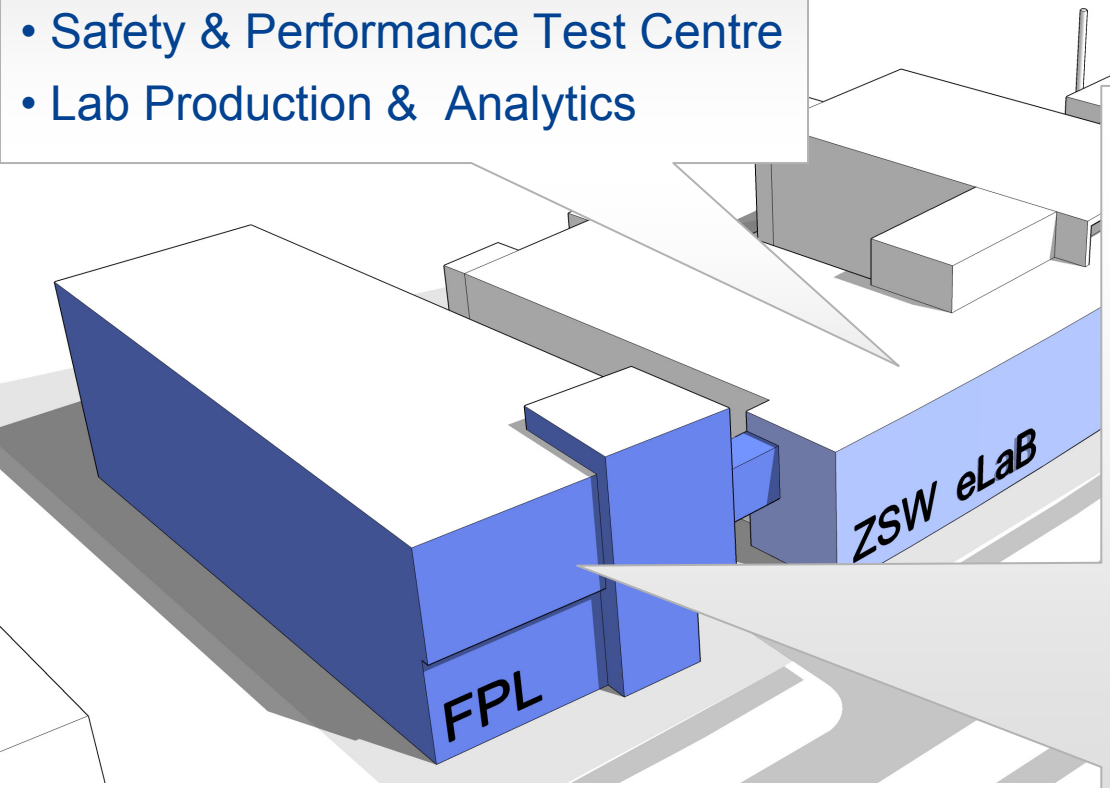
for

Large Size Li-Ion-Batteries

Production Technology for Large Size Cells

Battery Research Centre ZSW eLaB today

- Safety & Performance Test Centre
- Lab Production & Analytics

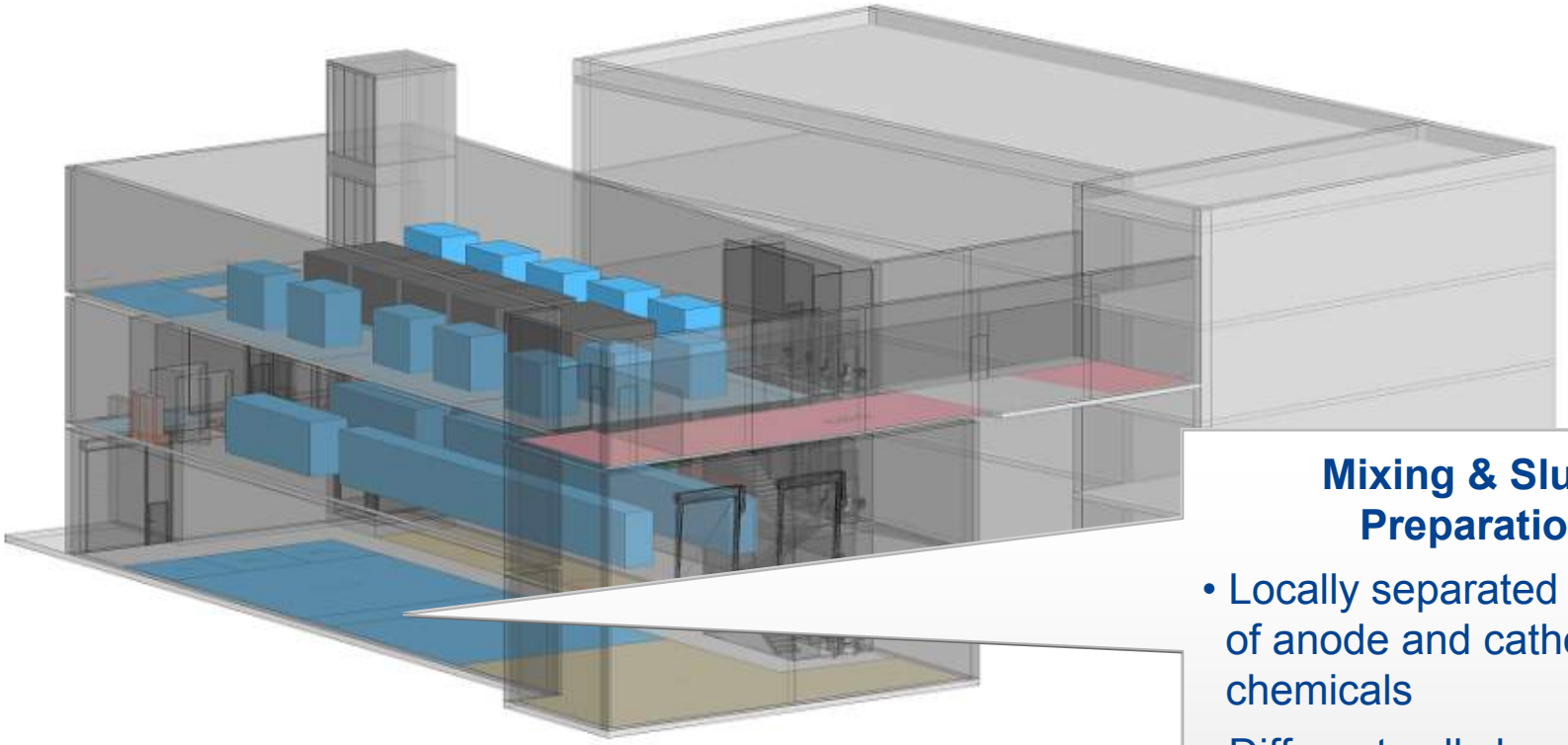


Research Center ZSW eLaB 2014 with:

Production Technology

- for large prismatic cells (20+ Ah)
- to optimize yield, quality & cost
- to demonstrate advanced cell chemistry in standard cells
- 3600 m² new lab area
- funded by BMBF & State of BW
- supported by KLiB eV

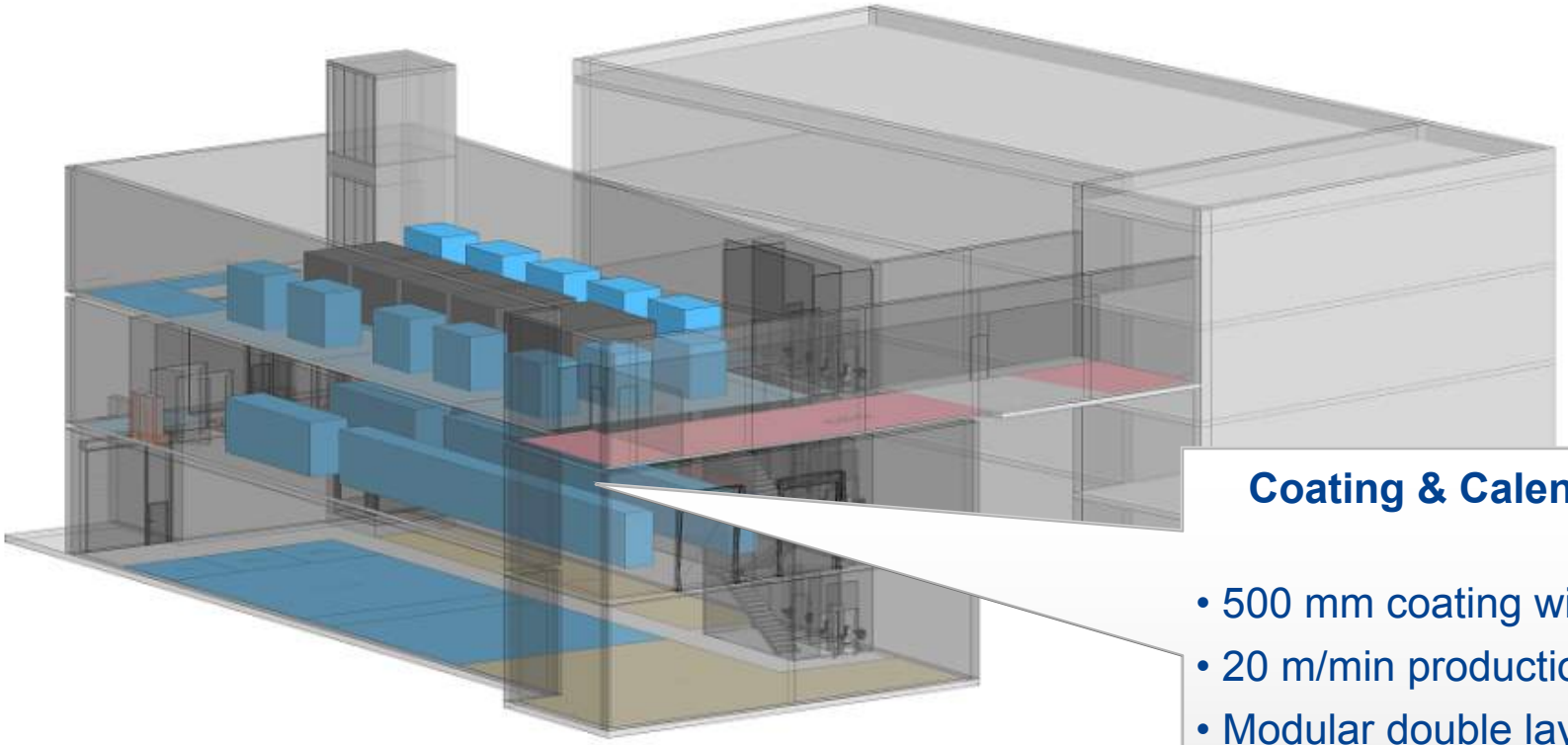
Production Technology for Large Size Cells



Mixing & Slurry Preparation

- Locally separated handling of anode and cathode chemicals
- Different cell chemistries
- Automatic weighing and materials loading
- 60 l slurry batches

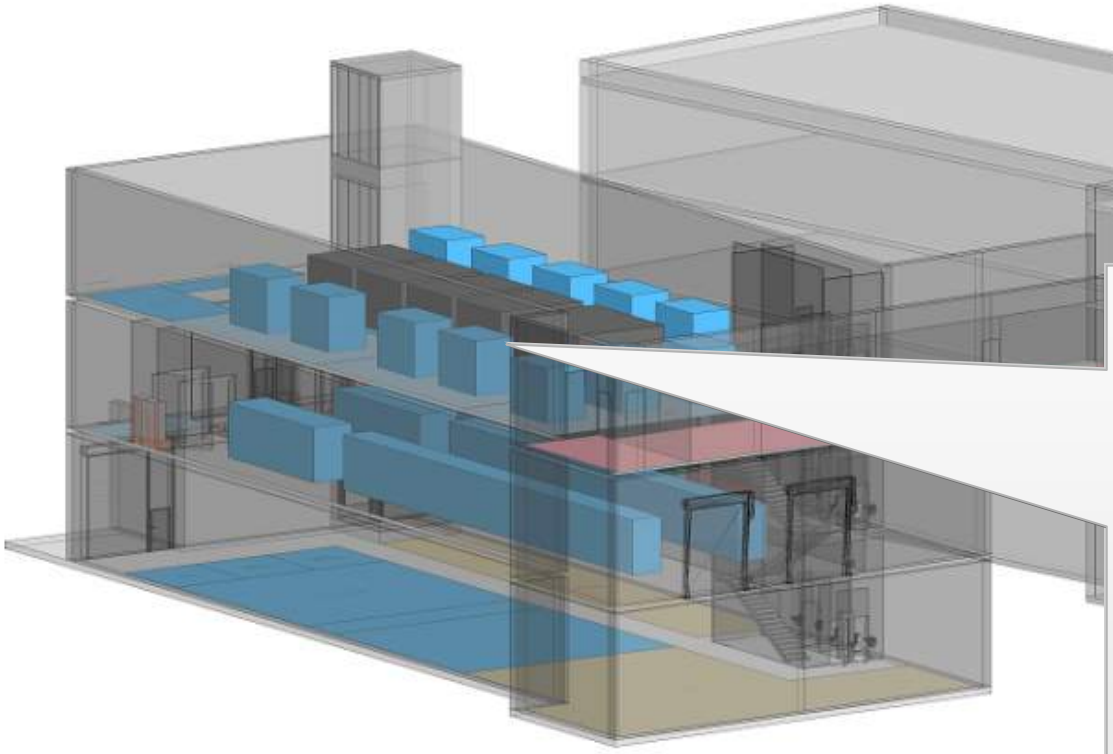
Production Technology for Large Size Cells



Coating & Calendering

- 500 mm coating width
- 20 m/min production speed
- Modular double layer electrode coating
- Various slurry application systems

Production Technology for Large Size Cells



Assembly & Formation

- 200 m² dry room (-60 °C d.p.)
- High speed electrode cutting and winding
- Automated assembling and filling stations
- 900 fully automatic and tempered cycling stations
- 2.000 storage stations

Next Steps

- Detailed planning for building and equipment until 03/2013
- Public Calls for Quotation 02/2013 until 06/2013
- Ground braking in second quarter 2013
- Completion of the building complex 05/2014
- Commissioning of complete production from 06/2014 on

eLaB 2014

Erweiterungsbau Forschungs - Produktions - Linie

Zentrum für Sonnenenergie- und Wasserstoff - Forschung Baden Württemberg

Unverbindliche Visualisierung · November 2012

We want to thank our Partners:

Safe the Date: 6th PBFC, June 3 – 7, in Ulm

6th International Conference on Polymer Batteries and Fuel Cells

PBFC 2013

Ulm, Germany

June 3-7, 2013

http://www.pbfc.eu/

Dates to remember

February 1, 2013 - Start of Registration
March 15, 2013 - Abstract submission
April 15, 2013 - Decision about acceptance of submitted abstracts
May 14, 2013 - Deadline for Early-bird registrations

WBZU ZSW

ZSW

Thank you for your Attention

Stuttgart:
Photovoltaik, Energiepolitik und Energieträger, Zentrale Dienste

Widderstall:
Solar-Testfeld

Ulm:
Elektrochemische Energietechnologien

Ulm:
Labor für Batterietechnologie (eLaB)