

SELF-HEALING BATTERIES: Where are we today?

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Competing in currents: strategies for advancing self-healing cells

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CURRENT MARKET AND POSSIBLE FUTURE ADAPTATIONS OF BATTERY CHEMISTRIES

Current Strengths Of Different Chemistries

Chemistry Type	Li-Ion	Solid State	Graphene-Based
Strength	<ul style="list-style-type: none"> Established technology with proven performance. High energy density. Widely adopted in various applications. 	<ul style="list-style-type: none"> Enhanced safety due to the absence of liquid electrolytes. Potential for higher energy density. Longer lifespan compared to traditional lithium-ion batteries 	<ul style="list-style-type: none"> High Energy Density Fast Charging Lightweight and Flexible Improved Lifespan

Strategic Imperatives for Market Success

Chemistry Type	Li-Ion	Solid State	Graphene-Based
Weakness	<ul style="list-style-type: none"> • Limited resource availability (cobalt, lithium). • Potential safety concerns (thermal runaway). • Limited lifespan compared to some alternatives 	<ul style="list-style-type: none"> • Current high manufacturing costs. • Limited scalability for mass production. • Challenges in maintaining consistent conductivity 	<ul style="list-style-type: none"> • Cost of Production • Mass Production Challenges • Integration Complexity

Critical Requisites for Battery Manufacturers

1 - Safety Standard Approvals

- Mandatory by law
- Human Life
- Beyond basic safety, a high level of reliability is expected

2 - Cost

- Maxing profits is manufacturer's priority.

3 - Handling At Battery Manufacturer Side

- Storage Performance
- Scalability
- Consistency at quality of manufactured commercial cells

4 - Performance

- Capacity, Cycle Life
- Charge Ratings
- Discharge Ratings
- Thermal Characteristics & Behaviour

Critical Requisites for Battery Manufacturers

5 - Compability

- Compatibility with existing battery technologies and seamless integration into manufacturing processes

6 - Customization Flexibility

- Flexibility for customization to accommodate varying specifications for different applications and industries

7 - Environmental Sustainability (With The Upcoming Battery Directive)

- Commitment to environmentally friendly production methods and recyclability of materials used

Summary & Notes

- **The differentiator that goes beyond basic safety lies in the performance of the batteries,** underlining the important role of excellence in this field.
- **Being able to produce a lot while making sure quality stays top-notch is crucial.** It ensures that customer orders will be supplied consistently.
- **Keeping cell prices in line with, or even better than, what's out there in the market is important to stay competitive.**
- With the new EU directives for cells and batteries, **reducing carbon emissions and using green energy while manufacturing is going to be a must.**
- Compatibility is a must-have. **Manufacturers can't be flexible in adapting to new cells for their existing products already in the market.**



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Thank you for your attention

