

Mechanical recycling of production scraps from electrode manufacture

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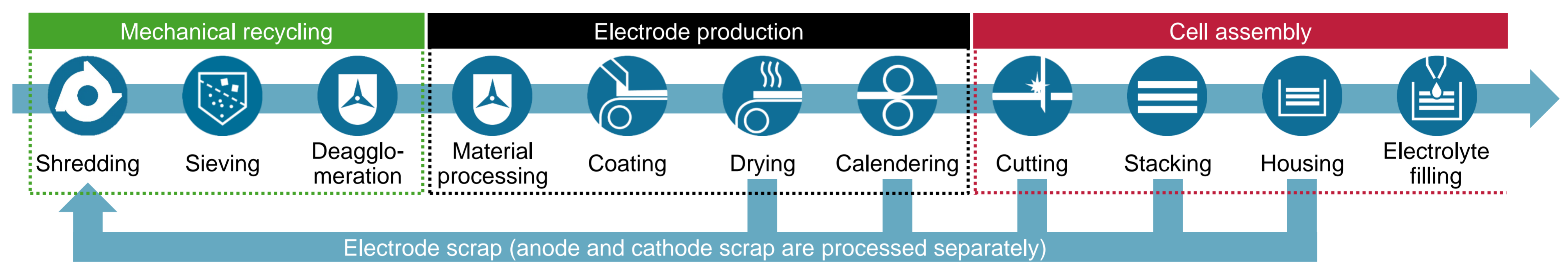
Initial situation

- **Economical and sustainable battery cell production** is a central cornerstone for electric vehicles to become an important part of the energy revolution
- Production costs of **battery cells** are dominated by approx. **75% material costs**, of which cathode materials make up approx. 50% of the costs
- Cost deficit due to **high scrap rates**, especially in the ramp-up phase of electrode production
- **High energy consumption** and **large carbon footprint** in battery cell production

Action to be taken

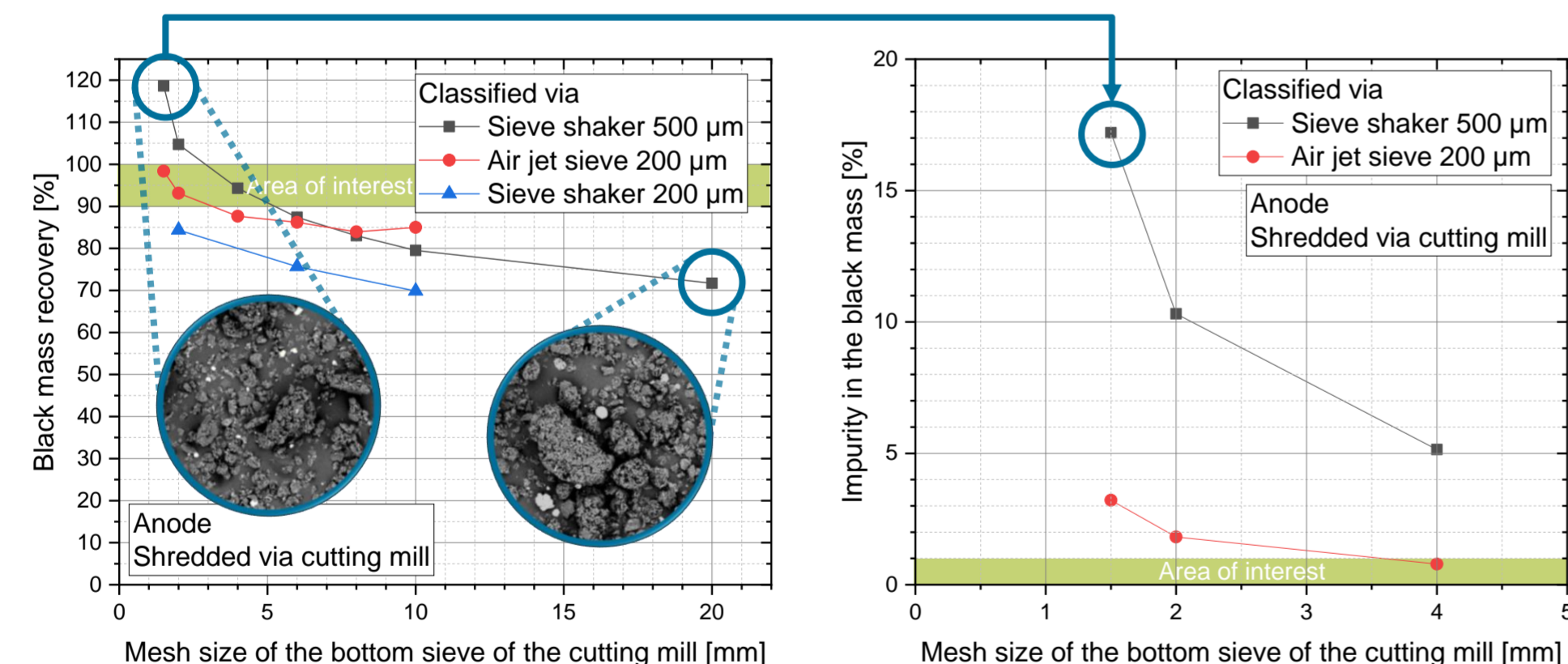
- **Direct return of electrode scrap** to electrode production → **significant environmental and cost benefits**
- **Targeted recycling** of anode and cathode scrap **without cross-contamination** → anode and cathode scrap are available separately

Process chain for the direct recycling of electrode scrap



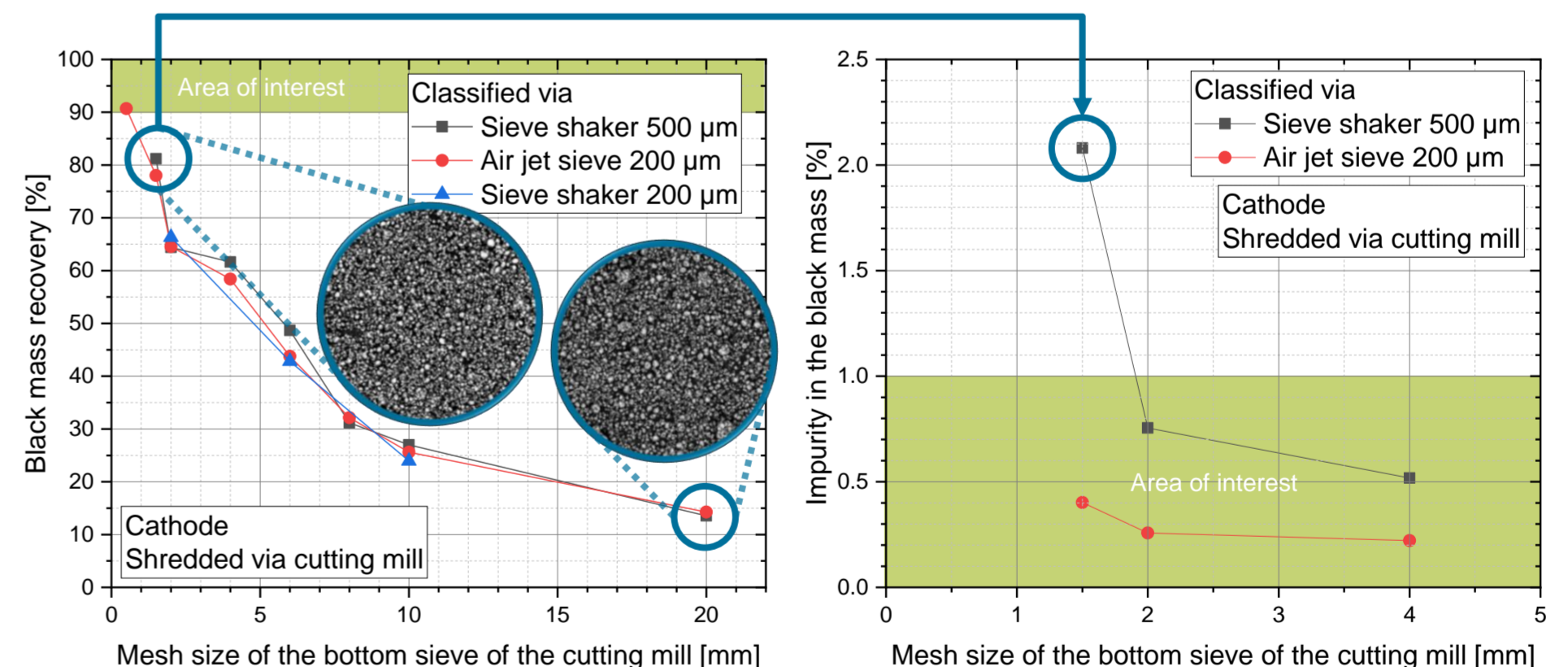
Mechanical recycling (Shredding & Sieving)

Anode



- Air jet sieve increases black mass recovery by additional mechanical stress using the same mesh size as in the sieve shaker
- Tighter meshes in the sieving machine lead to lower impurities

Cathode



- Almost no aggregates after shredding → sieving machine type has no influence on black mass recovery
- Tighter meshes in the sieving machine lead to lower impurities

Conclusion & Outlook

- Black mass recovery and the impurities contained are influenced by the mesh size of the bottom sieve of the cutting mill in opposite ways
 - Process routes and settings must be considered and set separately for cathodes and anodes
- Black mass from anodes will be further processed to break down larger aggregates
- Additional and/or optimized mechanical and/or thermal stress will be applied to further improve the decoating of the electrode and minimize contamination

Acknowledgement

Financial support was provided by the Federal Ministry of Education and Research and the Project Management Jülich within the research project „Action“ of the greenBatt competence cluster. We also thank our project partners for providing the cathodes (ZSW) and for the ICP-MS measurements (Fraunhofer IST).