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18. abstract Background and objectives Stationary energy storage systems are needed to make better use of the volatile and only instantaneously available energy from wind and solar power. Redox flow batteries (RFB) store electrical energy in liquid electrolytes and enable energy capacities in the kWh to MWh range. One advantage of redox flow batteries is the independent scalability of power (MW) and energy (MWh). This makes it possible to design the battery system flexibly for a wide range of applications. They are suitable as intermediate storage for grid stabilization, in emergency power generators, as buffer storage for wind and solar power systems or for off-grid power supply, for example for mobile phone transmitters or remote households. The aim of this project is to develop two new core components of RFB stacks, the bipolar plate (BPP) and the monopolar plate (MPP). The BPP acts as a conductive separator between the electrically series-connected battery cells, whereas the MPP is a component of the stack termination, which typically contains a copper plate as a current collector. The objectives of the project are a) to design the BPP as a composite plate using a simple manufacturing process with a flow structure, b) to dispense with a fluoropolymer for the binder polymer, c) to replace the current stack termination consisting of several functional layers with a single MPP with increased transverse conductivity and d) to develop a new, more efficient and more reliable battery cell separator.	

Results

As part of the Emboplate project, numerous new bipolar plate/monopolar plate materials were developed and characterized using standard materials science methods as well as directly in RFB test cells. It was shown that not every polymer tested is suitable for use in a redox flow cell system.

A potential new material based on a fluorine-free polymer was successfully developed that meets the requirements of a redox flow cell in terms of permeability, electrical conductivity and strength. This applies both to the application as a bipolar plate and as a monopolar plate. However, there is certainly still potential for optimization in the area of the monopolar plate.

The production of the samples was scaled up to pilot plant scale as part of the project, so that plates for prototype systems could be produced.

Conclusion

The objective of the project was achieved. In the course of the Emboplate project, a fluorine-free, conductive and corrosion-resistant bipolar/monopolar plate material was developed and production was scaled up to pilot plant scale. Prototypes can be produced.

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