

## Internal Heat Distribution of Li-Ion Secondary Batteries

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Li-ion secondary batteries (LIBs) are considered to be the most promising candidate for personal automotive vehicles, when considering their rather low weight. Large format LIBs require a good understanding of the thermal behavior, especially during charging at high rates. In addition, to avoid the thermal runaway is the main safety issue when a battery is in use. Therefore thermal management and knowledge of the internal heat distribution is crucial. This requires the determination of heat sources as well as the thermal conductivity of all different battery components. Burheim et. al [1] recently reported thermal conductivities of some electrode materials and discussed different heat sources inside a LIB. The thermal conductivity of a separator has not been reported so far. The aim of this work is to be able to model internal heat distribution inside LIBs for some combinations of commercial available electrode materials and separators. The apparatus is described in great detail in [2]. It is able to measure the heat fluxes as well as the sample thickness and the temperature drop over the sample. The measurements were carried out with and without electrolyte (50:50 vol% EC/DEC), at different compaction pressures of 2.3 bar up to 11.5 bar. It is shown that the presence of an electrolyte as well as the compaction pressure have a significant influence. The presented 2D thermal model of a LIB is constructed using non-equilibrium thermodynamics. We give the internal heat distribution for various combinations of materials at different operating conditions.

### Acknowledgments

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### References

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- [2] O. S. Burheim, P.J.S. Vie, J.G. Pharoah, S. Kjelstrup; J. Power Sources 195 (2010) 249–256.