Contribution ID: **22** Type: **not specified**

New Current Collectors for Lithium-Metal Batteries

Tuesday, 4 June 2024 13:00 (40 minutes)

Lithium-metal batteries (LMBs) are considered the next big step towards higher energy densities. The anticipated increase in energy density, however, can be achieved solely, if the lithium foil used at the negative electrode will be sufficiently thin.[1,2] This, in turn, requires an essentially perfect reversibility of the lithium plating and stripping process with a Coulombic efficiency approaching 100%, i.e., the absence of essentially any side reaction that consumes electrochemically active lithium (and electrolyte), and a very homogeneous lithium deposition upon charge.[3,4] The commonly used commercial copper foil, however, does not allow for one or the other. Herein, our recent work on the development of new current collectors for the negative electrode of LMBs is presented, including the modification of the copper current collector to enhance the reversibility and homogeneity of the lithium plating process as well as fundamentally new concepts. A particular focus is set on the development of a better understanding of relevant impact factors, always keeping in mind in every case the eventual requirements for complete LMB cells that could be of commercial relevance.

References

[1] J. Liu, Z. Bao, Y. Cui, E. J. Dufek, J. B. Goodenough, P. Khalifah, Q. Li, B. Y. Liaw, P. Liu, A. Manthiram, Y. S. Meng, V. R. Subramanian, M. F. Toney, V. V. Viswanathan, M. S. Whittingham, J. Xiao, W. Xu, J. Yang, X.-Q. Yang, J.-G. Zhang, Nature Energy 2019, 4, 180.

[2] C. Niu, D. Liu, J. A. Lochala, C. S. Anderson, X. Cao, M. E. Gross, W. Xu, J.-G. Zhang, M. S. Whittingham, J. Xiao, J. Liu, Nat Energy 2021, 6, 723.

[3] X. He, D. Bresser, S. Passerini, F. Baakes, U. Krewer, J. Lopez, C. T. Mallia, Y. Shao-Horn, I. Cekic-Laskovic, S. Wiemers-Meyer, F. A. Soto, V. Ponce, J. M. Seminario, P. B. Balbuena, H. Jia, W. Xu, Y. Xu, C. Wang, B. Horstmann, R. Amine, C.-C. Su, J. Shi, K. Amine, M. Winter, A. Latz, R. Kostecki, Nat. Rev. Mater. 2021, 6, 1036.

[4] B. Horstmann, J. Shi, R. Amine, M. Werres, X. He, H. Jia, F. Hausen, I. Cekic-Laskovic, S. Wiemers-Meyer, J. Lopez, D. Galvez-Aranda, F. Baakes, D. Bresser, C.-C. Su, Y. Xu, W. Xu, P. Jakes, R.-A. Eichel, E. Figgemeier, U. Krewer, J. M. Seminario, P. B. Balbuena, C. Wang, S. Passerini, Y. Shao-Horn, M. Winter, K. Amine, R. Kostecki, A. Latz, Energy Environ. Sci. 2021, DOI 10.1039/D1EE00767J.

Primary author: BRESSER, Dominic (Karlsruhe Institute of Technology (KIT))

Presenter: BRESSER, Dominic (Karlsruhe Institute of Technology (KIT))