

# Discharge evolution rate of the lithium batteries

A. Z. Shekhtman \*

KVANT

Moscow, Russia

The intensive research method is a way to study macroscopic mediums by means of research of functional behavior of processes going inside them. One of the main features of the method is quick acquisition of the experimental data, which contain sufficient information to comprehensively describe functional behavior of these processes. The data are acquired under action on a studied system of a sequence of short-time constant-strength influences alternating with pauses, with the influence strength being increased from one influence to the next. They allow us to broadly use existent mathematical methods of data processing and develop the new ones. Among them we can mention characteristic transforming of the experimental data to reveal and to study different functional stages of process in a researched system and their characteristics.

Here, we accent on studying of local characteristics of lithium batteries discharge stages and among them, at the first turn, on studying of the characteristics connected with partial time-derivatives of different relevant quantities. These discharge evolution rate characteristics give direct information about rates of leading processes going during different stages of discharge evolution and are quantities of undoubted interest. For the very beginning of a small-current discharge, some of them can be find especially simply. Indeed, at small times of discharge evolution and small values of influence strength parameter, we can expect that relevant quantities and their derivatives will have almost the power dependence on an influence strength parameter. And if so, characteristic indexes of considered quantities must have quasi-flat sections in this region, and for the very beginning moment of a discharge, values of the indexes of both considered quantities and their partial time-derivatives in these sections coincide.

If the time of process evolution and influence strength parameter is not small, there is the same problem for finding of both integral and local characteristics: a regular procedure of their finding. One of the possible ways is the procedure that was outlined in / 1, 2 / and need to be developed further. Alternative to it by now is a guess-and-check selection of characteristic transformations to find the required one.

## Acknowledgements

The author would like to thank his eldest son for the support of the study.

## References

1. US patent pending.
2. A. Z. Shekhtman, The 201st Meeting of The Electrochemical Society, Philadelphia 2002, abstr. 1366; the 202nd Meeting of The Electrochemical Society, Salt Lake City 2002.

\*Current address: 71 Alicante Aisle, Irvine, CA 92614,USA.