Discharge evolution stages of the lithium batteries and the relevant parameter of discharge evolution.

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As show results of experimental research, at not the very small discharge times, characteristic times of discharge evolution in the lithium batteries are determined by relatively slow changes in their inner medium. The current only provokes them but doesn't determine their times. In the region of small-current discharges, these changes have a character of alternating stages of comparatively quick and slow changes. They could be connected with expansion of the lithium electrode surface film and with coming some by-products of electrolyte-electrode interaction out of film pores, where they are considered to be / 1 /. These processes change porous structure of the film and consequently can change both the battery inner resistance and the lithium electrode potential and determinate characteristic times of discharge evolution at relatively great discharge times. A theoretical estimation gives reasonable values for a possible contribution of these processes in lithium electrode potential changes. There is not sufficient information at this point to affirm that only "the coming out" or a smooth film expansion lead to appearance of the regions of quasi-constant values of the characteristic indexes of battery relevant quantities and inverse characteristic times of their changes in dependencies of these characteristic functions on the battery polarization. To elucidate the cause of appearance of above mentioned features of the characteristic functions, a further research is necessary.

As for the very small discharge times, the discharge time possibly is not a relevant parameter of discharge evolution. And if so, it could lead to a chaotic contribution in behavior of the characteristic indexes calculated at constant discharge times for the first discharges of the discharge series in this region / 2 /. May be, the charge that passed through the battery until a considered discharge time will be better discharge evolution parameter in this case.

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References

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