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13:15 – 14:00 Uhr

Supercapacitor specialities – Technology Review

Prof. Dr. Gleb Yushin

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Abstract. The key advantages of supercapacitors over batteries include much higher power density, much lower internal resistance, broader temperature window of a stable operation, very rapid charging (in seconds or less), higher (up to 98%) round-trip efficiency and significantly longer cycle life possible (millions of cycles).

The progress in the performance improvements of supercapacitors combined with nearly ten-fold decrease in cost resulted in a rapid expansion of their successful commercial applications. Such applications are no longer limited in the field of portable electronics, but greatly expanded to large-scale applications, such as advanced distribution and smart grid, large-scale uninterruptible power supplies, wind turbines, power for large scale ground, water and aerial transportation, energy-efficient industrial equipment and others.

This talk will provide a comprehensive review of the latest commercial applications of supercapacitors and how various designs of these devices impact their cost and performance, thus offering application-specific value proposition. In order to offer some guidance for future research on supercapacitor materials for improved device performance, the talk will additionally provide a brief overview of the current understanding of the structure-property relationships related to the transport and adsorption of ions within the supercapacitor electrode materials as well as undesirable side-reactions, which lead to self-discharge and device degradation.