SYNTHESIS AND CHARACTERIZATION OF HARD CARBONS FROM D-GLYCOSE

Meelis Härmas[1]

[1]*Institute of Chemistry, University of Tartu, Ravila 14A, 50411 Tartu, Estonia*
e-mail of presenting author: meelisharmas@gmail.com

Various electrochemical methods have been applied to establish the electrochemical characteristics of the electrical double layer capacitor (EDLC) consisting of the 1 M triethylmethylammonium tetrafluoroborate solution in acetonitrile and activated carbon based electrodes. Activated microporous carbon materials used for the preparation of electrodes have been synthesized from the hydrothermal carbonization product (HTC) prepared via hydrothermal carbonization process of D-(+)-glucose solution in H_2O, followed by activation with $ZnCl_2$, KOH or their mixture. Highest porosity and Brunauer-Emmett-Teller specific surface area (S_{BET} = 2150 m^2 g^{-1}), micropore surface area (S_{micro} = 2140 m^2 g^{-1}) and total pore volume (V_{tot} = 1.01 cm^3 g^{-1}) have been achieved for HTC activated using KOH with a mass ratio of 1:4 at 700 C. The correlations between S_{BET}, S_{micro}, V_{tot} and electrochemical characteristics have been studied to investigate the reasons for strong dependence of electrochemical characteristics on the synthesis conditions of carbon materials studied. Wide region of ideal polarizability ($\Delta V \leq 3.0$ V), very short characteristic relaxation time (0.66 s), and high specific series capacitance (134 F g^{-1}) have been calculated for the mentioned activated carbon material, demonstrating that this system can be used for completing the EDLC with high energy- and power densities [1].

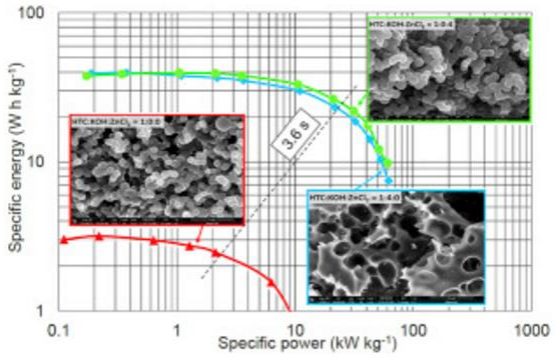

Fig.1 Specific power and energy dependances for different carbon materials [1].

References

1. M. Härmas, T. Thomberg, H. Kurig, T. Romann, A. Jänes, E. Lust, *Microporous–mesoporous carbons for energy storage synthesized by activation of carbonaceous material by zinc chloride, potassium hydroxide or mixture of them*, J. Power Sources, 326 (2016) 624-634.

Euroopa Liit
Euroopa
Regionaalarengu Fond

Eesti
tuleviku heaks