FROM LAYERED STRUCTURE TO POROSITY – ACTIVATED HARD CARBON FOR SODIUM-ION BATTERIES

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The research on sodium-ion batteries (SIBs) with hard carbon (HC) anodes has proved promising for large-scale stationary energy storage. Nevertheless, the exact sodium storage mechanism in HCs remains uncertain, inspiring the detailed study of the structure of HCs. Thus, we present a study focusing on the evaluation of the layered- (from wide-angle x-ray scattering (WAXS) data, with Ruland and Smarsly algorithm [1]) and porous structure (described with small-angle neutron scattering (SANS) data model-free analysis, combining Schiller, Mering, Perret, and Ruland approaches [2]) of carbon materials.

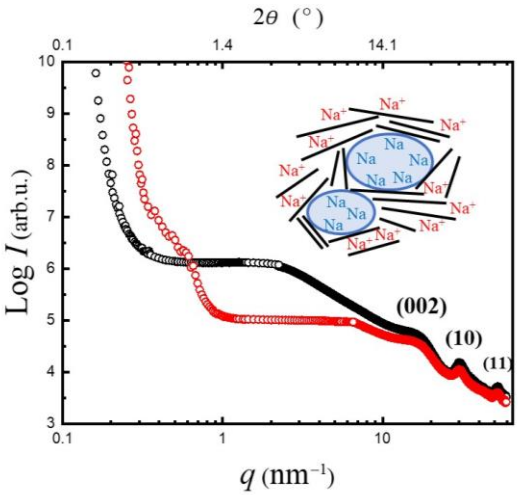

Figure 1. *Combined SANS and WAXS scattering patterns for hard carbon's porous- and layered structure.*

This presentation reveals exciting results that opens new perspectives to the material development for SIB HC anodes. During activation of the hard carbon materials activated with zinc chloride with ratios 1:1.5 and 1:2 significant differences in the interlayer arrangement, pore sizes, and the degree of disorder appeared. The presented results indicate the role of different structural parameters on the charge-discharge plateau and sloping regions, guiding to the better understanding of the sodium storage mechanism in HC anode.

References

1. Ruland W. Smarsly B. 2002, J Appl Crystallogr, 35, 624–633.
2. Härk E. Ballauff M. 2020, C, 6, 82.

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