

Electrochemical Behavior of Nanostructured Copper Particles on Graphite for Application in Lithium Ion Batteries

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Lithium ion batteries are the most commonly used rechargeable batteries for portable electronic devices nowadays. To be successful for future applications it is necessary to improve for example capacity and long term stability [1]. Graphitic materials are utilized as anode materials in most commercial lithium ion batteries. It was reported that copper coated graphite showed superior electrochemical properties compared to the pristine material [2]. As seen in figure 1 a homogeneous coating with copper nanocrystals on a graphitic surface was obtained by the deposition of copper through decomposition of gaseous copper formate ($C_2H_2CuO_4$).

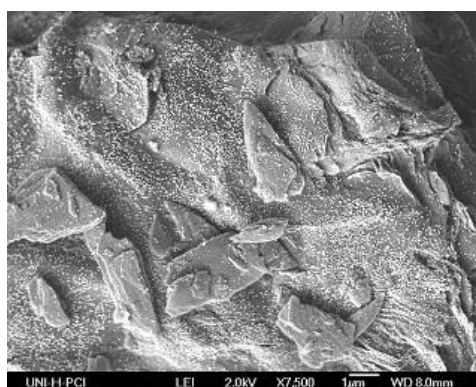


Figure 1: SEM image of copper coated graphite

To prove the suitability of this material for battery applications electrochemical characterizations are performed. The material is electrochemically cycled and compared to pristine graphite to see whether capacity or cycling stability are improved. Cyclic voltammetry was applied to characterize reactions within the applied voltage range. The composite materials with different aging stages are investigated via electrochemical impedance spectroscopy.

The copper particles on graphite showed a higher discharge capacity than the pristine graphite. A presumable reason for this is a reduced contact resistance between active material and the metal foil.

References

- [1] M. Gaberscek, J. Moskon, B. Erjavec, R. Dominiko, *Electrochem. Solid-State Lett.*, **11** (2008) A170-A174.
- [2] K. Guo, Q. Pan, L. Wang, S. Fang; *J. Appl. Electrochem.*, **32** (2002) 679-685.