Electrochemical Materials – Structure in Action

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There are a number of different examples of how *in situ* X-ray diffraction have been used to study lithium insertion/extraction mechanisms of electrode materials in Li-ion batteries [1,2]. In general, the structural changes during a continuous discharge or charge of the battery are followed, giving information about phase transformations in the material. Few, however, have utilized *in situ* X-ray diffraction during potential steps to get time resolved information of the material's response to, for instance, pulsed charges. With the use of synchrotron radiation with high beam intensity and therefore fast exposure times, new results will be presented for some important cathode materials in Li-ion batteries, for example $LiNi_{0.5}Mn_{1.5}O_4$, vanadium-oxide nanotubes and Mo_6S_8. For this purpose, different instrument geometries and detector systems for transmission mode have been explored in combination with special built sample holders. All the experiments have been carried out at MAXlab, the Swedish synchrotron radiation source but the quality of the result will discussed in the light of earlier obtained results using "in-house" *in situ* X-ray diffraction.

[1] DahnJ. R., Py M. A., Haering R. R., *Can. J. Phys.*, 1982, **60**, 307. [2] Gustafsson T., Thomas J. O., Koksbang R., Farrington G. C., *Electrochim. Acta,* 1992, **37**, 1639.

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