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Neutron depth profiling at the focused neutron beam of MARIA: towards studies of Li kinetics in all solid state batteries.

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Neutron depth profiling (NDP) allows for the determination of the in depth distribution of an appropriate light elements in a few micrometers of solids. It is based on the energy analysis of charged particles produced upon the capture of thermal (cold) neutrons by isotopes with a large neutron cross-section. This technique is the method of choice for studies of Li migration in all solid state batteries. However, the required high depth resolution and high counting rates can only be achieved at the high flux facilities. We have recently built a new multi detector NDP facility designed for the focused neutron beam of reflectometer MARIA (MLZ) that will allow us to do fast NDP measurements on a minute rate. This paves the way to in situ/ in operando studies of Li migration and makes exploring the fast battery charging and the battery degradation in time possible.

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