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Neutron imaging of Li-ion batteries with fission and thermal neutrons

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Neutron imaging provides outstanding sensitivity to light elements, e.g. high contrasts between hydrogen containing materials and metals. The neutron imaging facility NECTAR at MLZ regularly uses a fission neutron spectrum with a mean energy of 1.9MeV. These high energy neutrons allow insight in large objects of up to several ten centimeters with a high selective contrast for hydrogen. In contrast thermal neutrons with a mean energy at 28meV show lower penetration power but provide a much better spatial resolution. A combination of these data will benefit from the even more selective contrast for hydrogen provided by fission neutrons, while thermal neutrons will serve to reach higher spatial resolution for structure materials surrounding the hydrogen containing materials. Therefore an upgrade of the instrument is currently ongoing to make both neutron energy ranges available at a single setup and benefit from their respective advantages to follow the electrolyte distribution inside lithium-ion batteries during operation.

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