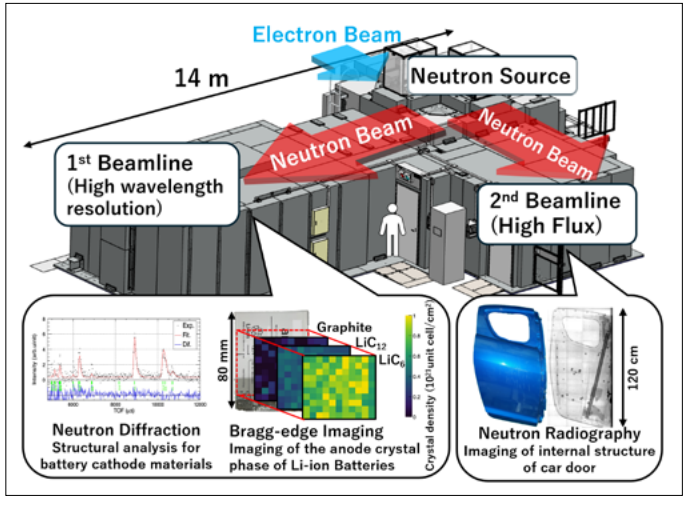
The AIST compact accelerator-based neutron source (AISTANS) and industrial applications

B. E. O'Rourke & KINO Koichi

Neutron beams are useful for non-destructive analysis of the interior of materials and structural components due to their high penetration and their ability to detect light elements such as hydrogen, which is difficult with X-rays. Consequently, interest in neutron spectroscopy and imaging is growing in the industrial sector. To provide a neutron analysis environment suitable for industrial applications, we have developed "AISTANS," a compact neutron analysis facility that balances accessibility with measurement flexibility [1].

Each of the two neutron analysis beamlines supplies neutron beams with distinct characteristics. This is achieved by passing neutrons, which are generated by irradiating a tantalum target with an electron beam, through two solid methane moderators with different designs, each of which cools the neutrons to energies (wavelengths) suitable for analysis. One beamline is optimized for neutron diffraction measurements and Bragg-edge imaging with high wavelength resolution. The other beamline utilizes high flux to perform radiography and computed tomography (CT) using a neutron flat-panel detector [2]. Leveraging these characteristics of AISTANS, a wide range of industrial applications are being pursued, such as imaging the crystalline phases of electrodes inside rechargeable batteries and non-destructive testing of automotive components.



The AIST Analytical Neutron Source, AISTANS and some typical industrial applications.

Reference:
[1] K. Kino et al., *Nuclear Inst. and Methods in Physics Research*, A **927,** 407–418, 2019
https://doi.org/10.1016/j.nima.2019.02.062
[2] T. Fujiwara et al., *Review of Scientific Instruments*, **93**, 013304, 2022
https://doi.org/10.1063/5.0066557

*AISTANS: Analytical facility for Industrial Science and Technology using Accelerator based Neutron Source