

## Complimentary diffraction techniques at Necsa

*Wednesday, 13 November 2019 12:15 (25 minutes)*

Complimentary to using synchrotron light, neutrons as well as laboratory X-rays play invaluable instrumental roles in the study of materials and their characteristics. South Africa, through The South African Nuclear Energy Corporation (Necsa) SOC Limited, offers both neutron and X-ray diffraction capabilities to the scientific and industrial communities. Necsa's X-ray diffraction laboratory houses two commercial diffractometers from Bruker: the D8 Discover (surface strain scanning) and the D8 Advance (surface powder diffraction). The Neutron Diffraction Facility is located at the SAFARI-1 research reactor and consists of the neutron diffractometers MPISI (Materials Probe for Internal Strain Investigations) and PITSI (Powder Instrument for Transition in Structure Investigations). Access to these instruments is through an active user program and beam time is awarded based on scientific merit. Services are provided at no cost (excluding consumables) under the National System of Innovation and are also available on a commercial basis for proprietary projects.

This presentation will give a brief overview of the instrument technical specifications and focus on typical projects and applications that have been investigated using these instruments. Stress related projects include surface and 2D depth-resolved stress mapping of large engineering samples to thin coatings. Examples of surface as well as bulk material crystallographic texture (preferred orientation) measurements will also be shown. Powder diffraction examples include the study of temperature dependent phase transformations using in-situ sample environments such as a closed-cycle cryostat and vacuum furnace. Room temperature / atmospheric studies and quantitative phase analysis are routinely performed. Student projects and facility visits are encouraged.

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**Session Classification:** Parallel-Chemistry and Materials

**Track Classification:** Materials