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NON-SPECIALIST LECTURE: Neutron diffraction facilities MPISI and PITSI at SAFARI-1

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Abstract content
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Two new neutron diffraction instruments have recently been commissioned at the SAFARI-1 research reactor of Necsa. The SAFARI-1 materials testing reactor has commemorated its 50 year operation on the 18th of March 2015. In line with this significant milestone, two new diffraction instruments, MPISI (Materials Probe for Internal Strain Investigations) and PITSI (the Powder Instrument for Transition in Structure Investigations) have been modernised through extensive in-house developments that have culminated with their full commissioning and characterisation during the past year. This brings the neutron diffraction capabilities in line with international standards and capabilities.

The instruments are respectively dedicated to the applications neutron strain scanning / texture, as well as neutron powder diffraction. The latter instrument is equipped with high (300 K < T < 1800 K) and low (3 K <T < 350 K) temperature sample environments to facilitate in-situ magnetism and phase transformation studies. Both instruments are equipped with Popovi type bent Si-multiwafer monochromators, sturdy high-precision diffractometers with integrated sample manipulation stages, adjustable apertures interchangeable with radial collimators, and area detectors. The data acquisition and control system was sourced from ANSTO, configured and implemented to comply with site-specific requirements. In addition, a wifi based remote hand-held instrument control module running on Android has been developed to aid with sample setups. In-house developed data reduction software, Scanmanipulator, was developed.

The instruments are now available for routine operation and accessible with the R&D User Facility Program. We shall present details of the instrument performances, illuminated with high-resolution results from the first completed projects.

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Primary author: Prof. VENTER, Andrew (Research and Development Division, Necsa Limited SOC, Pretoria, South Africa)

Co-authors: Mr RAATHS, Christo (Necsa Limited SOC); Mr MARAIS, Deon (Necsa Limited SOC); Dr HAYES, Michael (Necsa Limited SOC); Mr VAN HEERDEN, Rudolph (Necsa Limited SOC); Ms SENTSHO, Zeldah (Necsa Limited SOC)

Presenter: Prof. VENTER, Andrew (Research and Development Division, Necsa Limited SOC, Pretoria, South Africa)

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