

The CARNAÚBA beamline of Sirius synchrotron light source - a platform for nanofocus studies

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The CARNAÚBA beamline of the Brazilian synchrotron light source, Sirius, is an X-ray nanoprobe for simultaneous multi-analytical and coherent X-ray imaging techniques, with spectroscopic capabilities in the 2.05 to 15 keV energy range. It includes X-ray diffraction (XRD), X-ray absorption spectroscopy (XAS), X-ray fluorescence (XRF), X-ray excited optical luminescence (XEOL) and ptychographic coherent diffractive imaging (ptycho-CDI). The sample is raster-scanned through the nanoprobe to provide two-dimensional maps, which can then be combined with a rotation for computed tomography. Two end-stations are under development: an all-in-vacuum and cryogenic nanoprobe (SAPOTI) and an environmental in-air nanoprobe (TARUMÃ). The TARUMÃ station, the first entering in operation, has a large working distance to accommodate more flexible sample environments, and to facilitate alignment and installation of ancillary instruments. Its mechanical design is heavily based on precision engineering concepts and predictive modeling. As an environmental nanoprobe, TARUMÃ will cover a large variety of scientific areas, from cultural heritage, agro-environmental, geophysical, and biological research to energy and other condensed matter-related areas. These areas are tackled using the innovative instrumentation solutions for in situ, operando, cryogenic, and in vivo sample environments developed for this station.

Primary author: Dr GALANTE, Douglas (Brazilian Center for Research in Energy and Materials, Brazil)

Presenter: Dr GALANTE, Douglas (Brazilian Center for Research in Energy and Materials, Brazil)

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