

Levitating Laser Heating Techniques for Synchrotron Radiation Experiments.

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By

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Abstract

This project is about the design, development and construction of individual components and equipment associated with a 125 watt Carbon Dioxide laser heated aerodynamic furnace that was capable of levitating and melting a 2mm sphere in a dedicated containerless nozzle. The technique allows a specimen to be heated to 3000° Kelvin, and the purity of the sample to be investigated without contamination. This novel experiment was designed and tested at Aberystwyth University, and subsequently installed and operated on the Synchrotron Radiation Source 6.2 x-ray beamline. Experiments using the laser heated aerodynamic furnace on refractory oxides at high temperatures have allowed the successful investigation of structural dynamics at the nano and atomic level, by the use of Rapid2 detectors, with particular interest in the recalescence and supercooled regions, with subsequent investigations resulting in the discovery and observations of the polyamorphic rotor.

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