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IN SITU NANOTOMOGRAPHY AT ID16B ESRF BEAMLINE

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Summary: An overview of the nanotomography at the ID6B beamline at the ESRF will be presented. The new in situ 4D imaging tool developed will be detailed and illustrated thanks to different examples on metallic and ceramics materials.

1. INTRODUCTION

In the framework of the European Synchrotron Radiation Facility (ESRF) upgrade program, a new nano-analysis beamline has been recently built on ID16 port[1]. At 165m from the in-vacuum undulator source, ID16B endstation offers a multimodal approach to characterize materials. Several micro-analytical techniques (X-ray fluorescence, X-ray absorption, and X-ray diffraction) combined with 2D/3D X-ray imaging (XRI, such as magnified tomography and laminography) can be performed with a high lateral resolution and a large energy range (6-30keV).

2. EXPERIMENTAL METHOD

In this work, we present the 3D phase contrast imaging technique. The nanotomography set up allows holotomography with a pixel size from 25nm to 150 nm to be performed. In addition, a new *in situ* set up has been developed at ID16B (Figure 1). This tool offers an unprecedented combination of nanometer pixel size (<100nm) and fast acquisition (<20s) for high temperature experiments (< 1000°C).

3. APPLICATIONS

The capabilities of the technique will be illustrated by several on-going materials investigations: ceramics and light alloys. Actual challenges as well as future possibilities offered by the Extremely Brilliance Source upgrade program at the ESRF will be discussed.

References

[1] G. Martínez-Criado, J. Villanova, R. Tucoulou, et al., *ID16B: A hard X-ray nanoprobe beamline at the ESRF for nano-analysis.* **J. Synchr. Radiat.,** 23 (2015), p 344, 352.

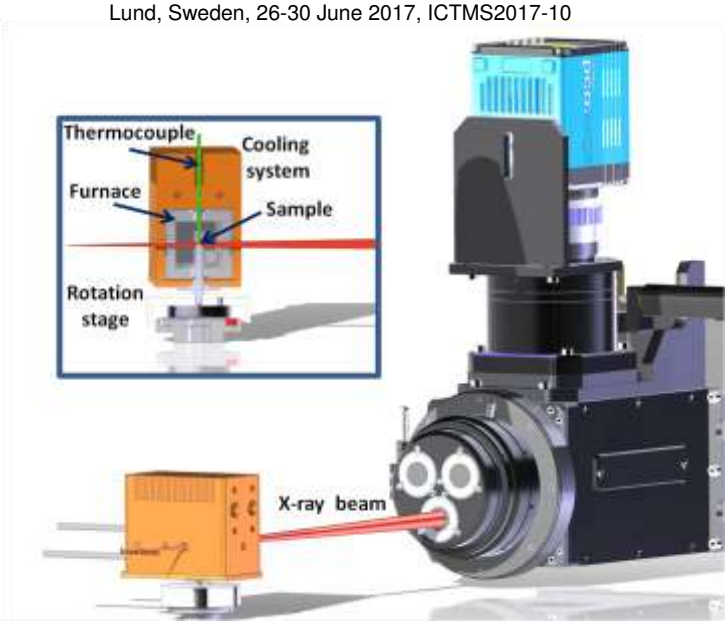

Figure 1: Schematic layout of the in situ nanotomography set-up at ID16B beamline.