UNIVERSITÀ DI TRENTO
Dipartimento di Ingegneria Industriale

DII Seminar

Metallurgical Studies with the HIPPO Diffractometer at LANSCE

April 22nd 2024, h. 15:00

Seminari room, Polo Ferrari 2 - Via Sommarive 9, Trento

Speaker: Sven C. Vogel - Materials Science and Technology Division, Los Alamos National Laboratory, Los Alamos, USA

Advantages of neutron diffraction for metallurgical studies are highlighted with research examples performed on the High Pressure – Preferred Orientation (HIPPO) diffractometer at the Los Alamos Neutron Science Center (LANSCE). We give a brief introduction of neutron diffraction and an overview of LANSCE. Neutrons offer unique advantages in particular for bulk microstructural characterization such as texture and phase composition. Therefore, the concept of neutron texture measurements will be introduced and its advantages discussed. As an example, we derive an explanation for observed texture memory effects during the α→γ→α transformation cycle in a 0.1%C-1%Mn hot-rolled steel sheet from the Kurdjumov-Sachs relationship. As an example for crystallographic studies of intermetallics, we describe how the previously inconclusive crystallographic structure of the Fe-Al ε phase, stable between 1095°C and 1231°C, was determined by in situ neutron diffraction to have the formula Fe5Al8 with a body-centered cubic structure of the Hume–Rothery Cu5Zn8 type at 1120°C.

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