Seminar by Manabu Ishimaru

Kyushu Institute of Technology, Japan

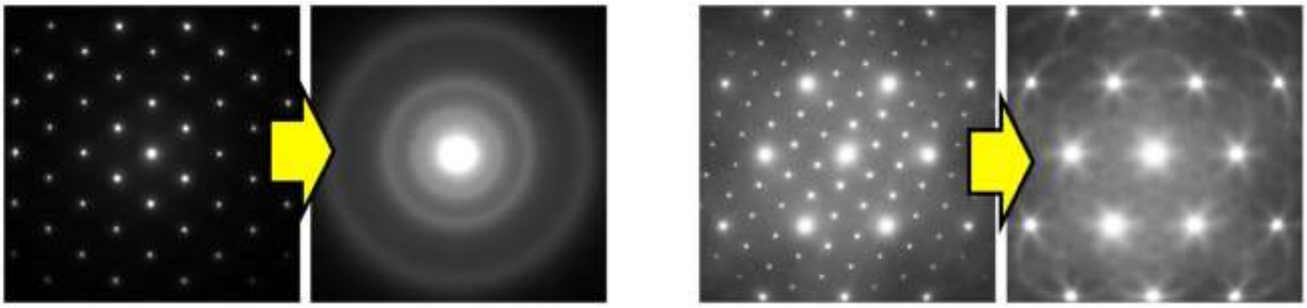
March 12 , 2025 – 11:00 am

Room 4-014 Institut Jean Lamour

Electron Diffraction Study of Short-Range Ordered Structures in Ion-Irradiated Ceramics

When crystalline materials with long-range order are exposed to radiation environments, their structure changes to a short-range ordered state with damage accumulation. Knowledge of radiation-induced structural changes is of technological importance for realizing desirable material properties and for predicting the fate of materials under radiation environments. Information on short-range ordered structures appears as diffuse scattering in diffraction patterns, but its intensity is so weak that the diffuse scattering associated with disordering has not been well investigated. Electron diffraction has the advantage of detecting weak scattering intensities, because of the strong interaction between the matter and electrons. Furthermore, the short wavelength of high-energy electrons enables us to obtain diffraction intensity profiles up to high scattering angles in the reciprocal lattice space, which is useful for precise amorphous structure analysis. We have been analyzing the structures of radiation-induced metastable crystalline and amorphous phases using transmission electron microscopy. In this seminar, we will report (1) radiation-induced amorphous structures studied by a quantitative analysis of halo intensities [1] and (2) short-range ordered metastable crystalline phase formed during disordering processes [2-4].

[1] M. Ishimaru, R. Nakamura, Y. Zhang, W. J. Weber, G. G. Peterson, N. J. Ianno, and M. Nastasi, J. Eur. Ceram. Soc. **42**, 376 (2022).
[2] M. Iwasaki, Y. Kanazawa, D. Manago, M. K. Patel, G. Baldinozzi, K. E. Sickafus, and M. Ishimaru, J. Appl. Phys. **132**, 075901 (2022).
[3] M. Iwasaki, M. K. Patel, G. Baldinozzi, K. E. Sickafus, and M. Ishimaru, J. Eur. Ceram. Soc. **44**, 3131-3138 (2024).
[4] T. Izumi, M. Iwasaki, M. K. Patel, G. Baldinozzi, C. Grygiel, and M. Ishimaru, Acta Mater. **284**, 120581 (2025).



Séminaire organisé dans le cadre du programme interdisciplinaire MAT-PULSE

MAT-PULSE

Materials and Physics @ Ultimate Scale: Nanotech for a sustainable digital world

MAT-PULSE

Materials and Physics @ Ultimate Scale: Nanotech for a sustainable digital world