

## **Interaction between stresses/deformation and phase transformation In situ study by high energy X Ray diffraction**

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In the present work in situ high energy X Ray diffraction is used to study the effect of plastic deformation on the phase transformation kinetics of a titanium alloy, as well as the effect of an applied stress on the isothermal bainitic transformation and on the martensitic phase transformation of steel.

The experiments were performed on ID15B beamline at ESRF. The high energy X-Ray beam used ( $E=89.240$  keV,  $\lambda=0.013906$  nm) allowed to analyse samples in transmission mode. The analysed area was  $100\mu\text{m} \times 100\mu\text{m} \times 4\text{mm}$ . To realize the experiments, we used the tensile testing machine from FAME 38. It allows to apply a controlled thermomechanical cycle (heating, cooling and stress variations). Debye Scherrer diffraction patterns were analysed. For the first time, the kinetics of the transformation under stress were obtained. Moreover the evolution of the diffraction peaks during the transformation will be shown to illustrate the stresses associated with the transformation progress.

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