MmePr41-004

X-ray diffraction evidence of the forward dynamic transformation of austenite into ferrite and retransformation after straining above Ae3 temperature in a microalloyed X70 steel

Rodrigues, S.F.(1); Rodrigues, M.G.(1); Siciliano, F.(1); Silva, E.S.(1); Reis, G.S.(1); Lima, M.N.S.(2); De Abreu, H.F.G.(2); Marciano, F.R.(3); Ferreira, J.C.(3);
(1) IFMA; (2) UFC; (3) UFPI;

It has been shown that when austenite is strained in its stable field, above the Ae3 temperature, its partial amount is transformed into ferrite. This phenomenon is known as Dynamic transformation (DT) and here direct evidence of this unusual behavior has been shown by means of tensile tests on an API X70 steel using a Gleeble thermomechanical simulator coupled with an X-ray diffraction system. The experiments were performed at 50 °C above the Ae3 and the X-ray diffraction signals were taken before, during and after hot deformation. The ferrite peaks show the evidence of this phase formation during deformation and its disappearance during isothermal holding. This research provides direct in-situ evidence of this phase transformation behavior.