Materials Chemistry and Physics

Volume 148, Issue 3, 2014, Pages 664-672

Precipitation kinetics and mechanical behavior in a solution treated and aged dual phase stainless steel

Riad BADJI, Nabil KHERROUBA, Brahim MEHDI, Bilal CHENITI, M. BOUABDALLAH, C. KAHLOUN, B. BACROIX

Abstract: The precipitation kinetics and the mechanical behaviour in a solution treated and aged dual phase stainless steel (DSS) are investigated. X-Ray diffraction, transmission and scanning electron microscopy techniques are used to characterize the microstructure and to identify its constituents. The precipitation kinetics analysis shows that the ferrite to ? phase transformation follows the modified Johnson Mehl Avrami (JMA) model containing an impingement parameter c that is adjusted to 0.3. Activation energies calculation leads to conclude that interface reaction is the main mechanism that controls the ? phase formation. Detailed analysis of the extent of the different tensile deformation domains reveals the significant contribution of both ? phase particles and dislocation accumulation to the strain hardening of the material

Keywords : alloys, aging, microstructure, mechanical properties