

SESSION 8: POSTER, GRAND PACIFIC BALLROOM

SUNDAY, OCTOBER 15, 2016

Characterization of thermal deformation behavior of a novel TiAl alloy

Wang Xiaopeng, Kong Fantao, Su Qin, Zhang Yu, Chen Yuyong, Harbin Institute of Technology

ABSTRACT

The high temperature deformation behavior of Ti–47Al–Cr–2Mn–0.5Fe–0.05Y alloy was investigated by hot compression tests in the temperature range of 1050–1250°C and strain rate range of 0.01–0.5 s⁻¹. The hot compression results indicated that the Ti–47Al–Cr–2Mn–0.5Fe–0.05Y alloy exhibits deformability at high temperature. The deformation activation energy of this alloy was 352.36 kJ/mol, which was higher than the diffusion activation energy of Ti and Al, and this result means that the main softening mechanism of thermal deformation was dynamic recrystallization. A thermal processing map of this alloy was developed on the basis of the flow stress and dynamic material model, and the optimum hot forging parameter for industrial productions was determined (1240°C, 0.05 s⁻¹). Finally, a crack-free Ti–47Al–Cr–2Mn–0.5Fe–0.05Y alloy pancake was prepared by canned forging.

KEYWORDS: TiAl alloy, thermal deformation, forging, processing map