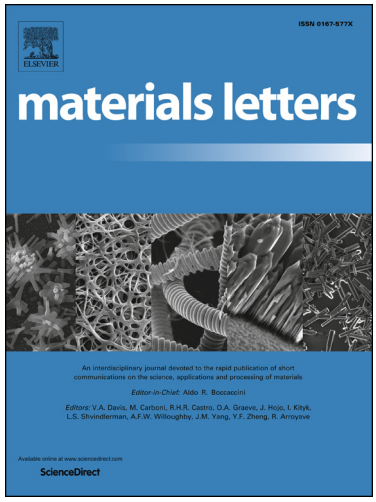

Shear localization and recrystallization in high strain rate deformation in Ti-5Al-5Mo-5V-1Cr-1Fe alloy

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Shear localization and recrystallization in high strain rate deformation in Ti-5Al-5Mo-5V-1Cr-1Fe alloy

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Abstract: To study the dynamic behavior and microstructural evolution in high strain rate deformation of Ti-5Al-5Mo-5V-1Cr-1Fe (Ti-55511) alloy, a series of forced shear tests of hat shaped specimens have been conducted using a split Hopkinson pressure bar combined with "strain frozen" technique. Localized shear band is induced in these tests. This paper indicates that the flow stress of Ti-55511 alloy is independent on the punching depth, and thermal softening has a minor effect on the onset of adiabatic shear band and dynamic recrystallization formation. The concept of "adhesive fracture" can be identified as the dynamic failure mechanism for Ti-55511 alloy based on the crack propagation path.

Keywords: Ti-5Al-5Mo-5V-1Cr-1Fe alloy; Microstructure; Recrystallization; Deformation and fracture; Adiabatic shear band

1. Introduction

The term "Adiabatic shear band" ("ASB") has been widely accepted by researchers since it was first proposed by Zener and Hollomon [1] and it is a well-known failure mechanism and occurs quite frequently in a variety of materials in dynamic loading situations [2]. Ti-5Al-5Mo-5V-1Cr-1Fe (Ti-55511), a typical near β type titanium alloy, is superior as an aircraft structural material due to its 15~20% weight loss as compared

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