

Microstructural Evolution And High Strain Rate Mechanical

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Under high strain rates, plastic deformation can be assumed to be adiabatic, and a significant temperature increase can occur at large strains. In this study, shock-hardened polycrystalline copper was subjected to high strains ($\epsilon \sim 5$) at high strain rates ($\dot{\epsilon} \sim 10^4 \text{ s}^{-1}$) using a stepped specimen in a Hopkinson bar. Microstructural analysis by transmission electron microscopy revealed that the highly deformed shear-band region consisted of a gradual decrease in grain size with ...

MICROSTRUCTURAL EVOLUTION IN HIGH STRAIN, HIGH STRAIN RATE ...

To study the microstructural evolution in high-strain-rate shear deformation of Ti-5Al-5Mo-5V-1Cr-1Fe (Ti-55511) alloy, a series of forced shear tests of hat-shaped specimens have been conducted...

Microstructural Evolution in High Strain Rate Deformation ...

increases with increasing strain rate but decrease with increasing temperature. The microstructure observations confirm that the high strain rate mechanical behavior of the cobalt base superalloys specimens are directly related to the effects of the strain rate, temperature and the evolution of the microstructural texture.

Microstructural Evolution and High Strain Rate Mechanical ...

Microstructural Evolution during Heat Treatment and High Strain Rate Deformation of an Fe-10Ni-0.1C Steel By Ian Harding Master of Science, Brown University, Providence, RI, 2015 Bachelor of Science, Temple University, Philadelphia, PA, 2013 A dissertation submitted to the School of Engineering in partial fulfillment

Microstructural Evolution during Heat Treatment and High ...

Constructing processing maps is a widely used method to analyze the microstructural evolution of alloys during their high-temperature deformation, based on their stress-strain relationship. To construct the processing map of an alloy, a dynamic material model (DMM) is required in order to predict the hot workability of the alloy , , .

High temperature deformation behavior and microstructural ...

The local temperature increase during high strain-rate deformation can influence the local microstructural evolution, including precipitation and dynamic/mechanical recrystallization within a shear band. In the case of a low[18, 31] -carbon steel, a temperature

Temperature increases and thermoplastic microstructural ...

It was found that the evolution of microstructure and strain-hardening induced by plastic deformation were occurred in the subsurface. When the microstructure, hardness and depth of the plastic deformation layer (PDL) reached a relatively steady state, the friction process transformed into stable-state stage.

Microstructural evolution and dynamic strain hardening in ...

Comprehensive transmission electron microscopical studies have been conducted for solution-hardened steels deformed at high (1000 s^{-1}) and low (0.001 s^{-1}) strain rates, in order to clarify the...

(PDF) Microstructural evolution at high strain rates in ...

The microstructural analysis demonstrates that dislocation motion are main deformatin mode to accommodate dynamic tensile deformation at high strain rates. In addition, the interactions of dislocation-dislocation and dislocation-second phase lead to the increase of flow stress and strain hardening with increasing strain rate.

Dynamic tensile properties and microstructural evolution ...

A higher strain rate usually offers strengthening by promoting dislocation and twinning kinetics. Meanwhile, the increase of temperature due to dissipative heating during high-strain-rate deformation results in softening. The microstructural evolution and the resulting mechanical properties depend on the competition between both effects [34,35].

Microstructural evolution of a nanotwinned steel under ...

The effect of elemental segregation on local hardness and microstructural evolution introduced by high strain-rate deformation in a CrMnFeCoNi high entropy alloy was investigated. Mn and Ni elemental segregation to interdendritic boundaries occurs during the solidification process and is intensified by dynamic deformation.

Effects of elemental segregation on microstructural ...

The goal of this study is to understand how microstructural evolution at large strains leads to transitions in rheological behavior. The shear zone we investigated exhibits higher strain and greater localization than previously studied shear zones in the Josephine Peridotite.

Microstructural and Rheological Evolution of a Mantle ...

Microstructural evolution and FCC twinning behavior during hot deformation of high temperature titanium alloy Ti65. ... For the texture evolution with a strain of 0.4, the preferred orientation distribution is affected by the fragmentation and spheroidization behavior obviously. ... The high activation energy means more energy is needed to ...

Microstructural evolution and FCC twinning behavior during ...

The microstructural evolution is a strong function of various FSW process parameters that influence the thermal cycle. The recrystallized grain size is typically in the range of 1-10 μm . By carefully controlling the process parameters and/or tool size, it is possible to obtain bulk nanocrystalline materials.

Microstructural Evolution — an overview | ScienceDirect Topics

Higher strain rate leads to finer recrystallized grains. The material constants (σ_0 , n , A) and deformation activation energy (Q) are calculated by the regression analysis. The increase of strain caused the decrease of Q , indicating the DRX occurred more easily.

Study on microstructural evolution and constitutive ...

Microstructural evolution during DTE was verified by means of an EBSD analysis, which revealed that a strong dual $\langle 001 \rangle + \langle 111 \rangle$ texture was developed regardless of the UFG and FG sizes. However, the UFG-B fragments exhibited that the $\langle 111 \rangle$ oriented fibers were replaced by the $\langle 001 \rangle$ orientated fibers as a result of mDRX, while the $\langle 111 \rangle$ component fraction in FG-200 saturated without any extensive reduction.

Deformation and microstructural evolution of ultrafine ...

On the microstructural evolution pattern toward nano-scale of an AISI 304 stainless steel during high strain rate surface deformation.

J. Mater. Sci. Technol.

The deformation microstructures and texture at five strain levels were observed and characterized using transmission electron microscopy (TEM) and neutron diffraction. The microstructures evolved within a framework common to medium and high stacking fault energy fee polycrystals.

Microstructural evolution in nickel during rolling from ...

Microstructural evolution in deformation zones corresponded to the variation of tensile stress-strain characteristics with temperature, reflecting the hardening or softening feature of matrix. Dynamic recovery ascribed to the flow softening of the composite at 700 $^{\circ}\text{C}$, while flow softening is owing to dynamic recovery and DRX above 800 $^{\circ}\text{C}$.