Study on the Mechanism of Texture Evolution and Activation of Slip Systems in the Tensile-Compressive Deformation of AZ31 Magnesium Alloy Extruded Bars

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Abstract

Magnesium alloys, renowned for their lightweight and high-performance attributes, have found widespread applications in aerospace, transportation, and other fields. However, the application of magnesium alloy bars in critical structural components is limited due to the asymmetry in tension-compression. Based on this, this paper conducts a differential analysis of the mechanical properties of the tensile-compressive deformation at different deformation rates. Reveals the mechanism of texture evolution during the tensile-compressive deformation of AZ31 magnesium alloy extruded bars based on in-situ Electron Backscatter Diffraction (EBSD) experiments combined with the Visco-Plastic Self-Consistent (VPSC) crystal plasticity finite element simulations. It clarifies the mechanism of how the stretching and compression deformation process Schmid Factor (SF) affects the slip systems. Research on the deformation mechanism of tensile-compressive deformation processes of AZ31 magnesium alloy extruded bars. Provide a theoretical basis for the application of magnesium alloy extruded bars.

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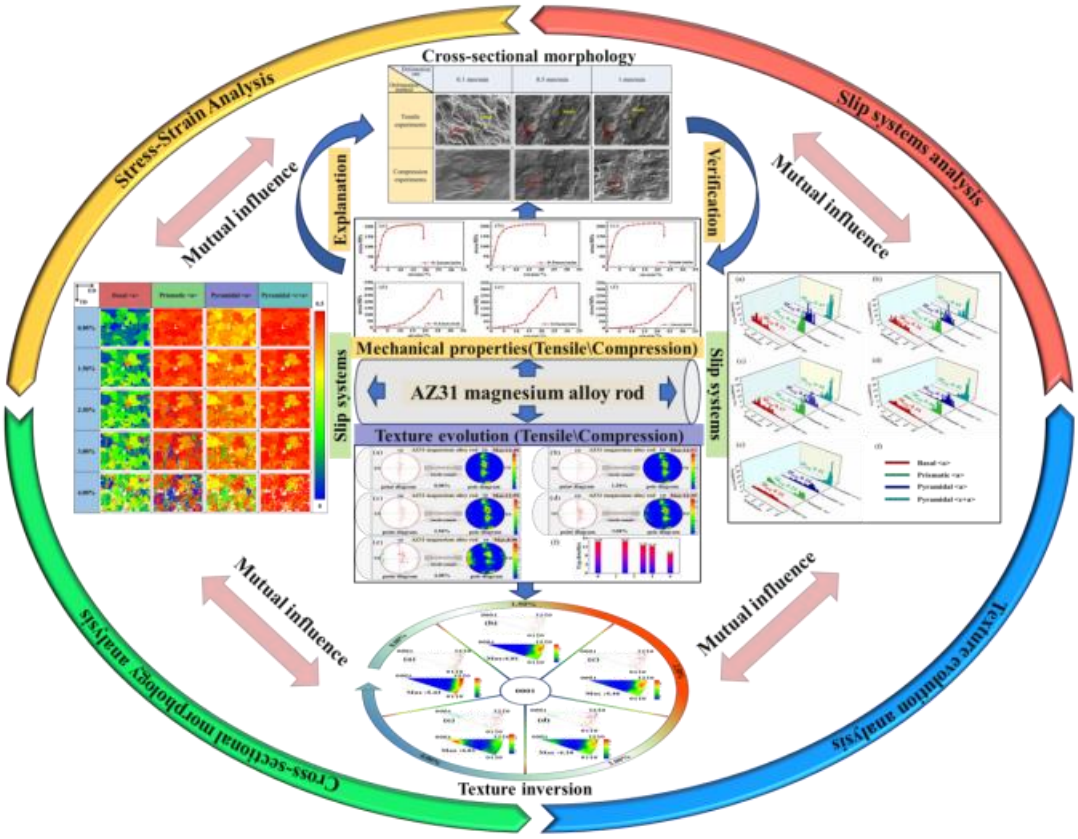

Innovative Description: Weakening of RD weave during axial compression of magnesium alloy extruded rods and emergence of a new bimodal weave in the ED.