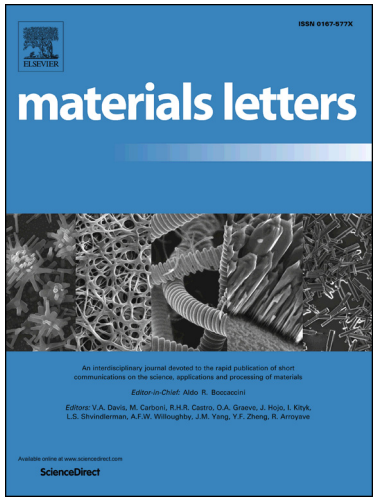


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# Intensifying Goss/Brass texture ratio in AA2024 by asymmetric cold rolling

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## Abstract

The effect of asymmetric cold rolling on the crystallographic texture of the AA2024 aluminum alloy was investigated. The texture after asymmetric cold rolling consisted of the strong Goss {011}⟨100⟩, Goss-Brass {011}⟨115⟩, Brass {011}⟨211⟩, and Rotated Goss {011}⟨011⟩ components (i.e. a strong α-fiber ⟨011⟩‖ND). It was found that asymmetric cold rolling present great differences in texture evolution relative to conventional cold rolling. The results showed that the asymmetric cold rolling of AA2024 at 20% and 40% thickness reductions led to increasing the Goss/Brass texture ratio to 1.44 and 1.32, respectively.

***Keywords:*** *Metals and alloys; Texture; Deformation*

## 1. Introduction

During almost 60 years, Al-Cu-Mg (2xxx) alloys have attracted much attention in military, airspace, and transportation industries. The main reason for this success is a combination of high specific strength and high fatigue resistance at ambient and elevated temperatures [1–5]. In order to further improve the fatigue resistance of Al-Cu-Mg aluminum alloys, many efforts have been made to reveal the microstructure and crystallographic texture effect on fatigue crack propagation [3–9]. It is well-accepted that the finer grain size was not always consistent with the higher fatigue resistance [4,10,11]. In fact, the formation of some texture components such as Goss orientation {011}⟨100⟩ during grain refinement leads to improvement of fatigue resistance [3–9].

Recently, researchers paid efforts to clarify the effect of crystallographic texture on fatigue resistance. In 2016, Zhao et al. [7] found that the Goss grains in the Al-Cu-Mg alloy, presented a significant fatigue performance, but the Brass grains exhibited a small resistance to fatigue crack propagation. They reported that the high Goss/Brass volume fraction ratio was responsible for the enhanced fracture toughness in the Al-Cu-Mg alloy. In 2017, Li et al. [4] proposed a new way to improve fatigue performance of this alloy mainly includes two steps: intensifying Goss texture component by hot

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