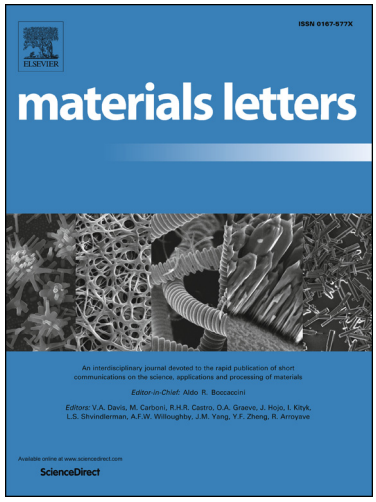


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# Unexpected Cube texture in cold rolling of copper

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## Abstract

Cold rolling of high purity copper by 60%-80% thickness reductions followed by quenching in ice water a recrystallization texture rather than a deformation texture was achieved. It was found that discontinuous dynamic recrystallization (DDRX) was responsible for nucleation of the new grains with Cube orientation at 60%, 70%, and 80% rolling reductions. In addition, with increasing rolling reduction, the recrystallization texture significantly decreased due to rotation of recrystallized grain towards deformation texture by slip.

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

## 1. Introduction

Crystallographic texture is very effective on chemical, physical, and mechanical properties of materials [1,2]. Evolution of deformation texture are not random as the fact that the deformation often occurs on the favorably slip systems and can be controlled by deformation process [1,2]. Texture evolution during rolling chain strongly affects the final properties of metals and alloys. The crystallographic changes involved in rolling process are the consequence of the deformation mechanisms such as slip or twinning [1,3]. Many researchers [4–7] have expressed that stacking fault energy (SFE) is the main effective parameter on the types of rolling texture in FCC materials. It is well known that a Copper or pure metal type texture develops during rolling of high-to-medium SFE (> 25 mJ $m^{-2}$) metals while a Brass or alloy type texture is obtained for low SFE (< 25 mJ $m^{-2}$) metals [8].

In materials of high-to-medium SFE such as high purity copper, slip is dominant and the initial texture tends to rotate towards the Copper {112}⟨111⟩ orientation. However, an unusual Brass-type texture was achieved by Gu et al. [5] in large-strain rolled copper from the initially ultrafine-grained copper obtained by eight passes in equal-channel angular pressing.

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