Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C2-018

Texture simulation of cold-rolled FCC metals by using Taylor model

Shih Chieh Hsiao
NCKU, Taiwan

The orientation of grains plays a significant role at the anisotropy of mechanical properties. In 1980s, Van Houtte proposed the revised model, as known as the relaxed constrained Taylor model, to predict the experimental rolling texture of high SFE metals. Until now, lot of researchers work on the evolution of the texture between experiment and simulation, but are not able to simulate all the specific texture simultaneously, and the intensity of them are quite different as well. Thus, in this research, we combined the full constraints and relaxed constraints Taylor models to predict the texture of severely cold-rolled copper, and compare the difference of texture between experiment and simulation quantitatively. This study consists of cold-rolling experiment and numerical simulation. In cold-rolling experiment, copper was rolled and measured by XRD and EBSD to analyze the texture and microstructure respectively. In numerical simulation, statistical 10,000 orientations were imported to the combined Taylor model to simulate the rolling texture measured by XRD. In experiment, the 95% cold-rolled copper shows high Cu (16.2%), S (34.6%) and Bs (14.4%) orientations, which are the main components of rolling texture of high-stacking-fault-energy metals. In simulation, the combined Taylor model successfully simulates high Cu (9.21%), S (23.24%) and Bs (13.81%) orientations. The results are showed as {111} pole figure in figure 1, symbol ●,▲ and ▪ stands for Cu, S and Bs respectively. The combined Taylor model is able to predict the deformed texture. Not only the preferred orientations but also the intensity are achieved.

sshawnnccatt@hotmail.com