ICSMA19 Metz, France, June 26 - July 1, 2022
International Conference on Strength of Materials

Nucleation texture prediction of IF Steel based on the Advanced-Lamel Crystal Plasticity code.

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Plastic deformation induces heterogeneities in dislocation density and preferred crystallographic orientations in the microstructure of polycrystals. During the early stages of the recrystallization process, rearrangement of dislocations may generate migration of high angle grain boundaries, which gives rise to strain-free crystallite volumes, the so-called recrystallization nuclei. In this regard, the nucleation process of recrystallization strongly depends on the pre-existing deformation state [1]. Therefore, an accurate description of the deformed state of the polycrystal might provide sufficient information to predict the possible nucleation texture. The present work addresses the prediction of nucleation textures in cold rolled IF-steel samples based on the crystal plasticity (CP) simulations performed with the Advanced-Lamel (ALAMEL) model [2]. In the present approach, it is shown that the nucleation texture of recrystallization can be simulated with reasonable accuracy through a statistical analysis of the ALAMEL modeling results. By considering the gradient of the Taylor factor between crystal orientations forming a pair in the ALAMEL simulation it is possible to model the appearance of the {311}<136> component in the nucleation texture [3]. Results obtained are compared with experimental EBSD results and previous works.

Keywords: Crystal Plasticity, Nucleation Texture, HAGB migration.

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