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

# Study on Goss Texture Development in Electrical Steel

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The present study investigates the role of shear banding on the development of Goss ($(110)[001]$) texture in electrical steel by electron backscatter diffraction analysis and crystal plasticity based simulation. High silicon (2.98-3.78wt.%) steel was first subjected to hot rolling followed by annealing. Cold rolling was then conducted up to 1.6 true strain. Coarse hot band annealed microstructure was found to promote shear band formation in $(111)[\bar{1}\bar{1}2]$ oriented grains owing to high Taylor factor. Rotated Cube ($(001)[1\bar{1}0]$) and near Goss ($(221)[\bar{1}\bar{1}4]$) orientations were observed inside those shear bands after around 0.8 true strain during cold rolling. The density of shear bands formed inside $(111)[\bar{1}\bar{1}2]$ oriented grains increased significantly on increasing the cold rolling reduction. Subsequently on annealing, the Goss oriented grains were found to evolve, irrespective of the position throughout the thickness. Crystal plasticity based analysis showed that Goss orientation may evolve due to crystal rotation on application of pure shear loading on an inclined plane from rolling direction. Further, consideration of Taylor factor demonstrates that the crystal rotation inside shear band was associated with geometrical softening which ceased after attaining Goss orientation.

*Keywords: Shear bands, Goss orientation, Electron backscatter diffraction, Crystal Plasticity, Electrical steel*

**Acknowledgment: Dr. A. Ghosh is thankful to DST, Govt. of India for providing financial support (Grant no. IFA17- ENG193)**