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

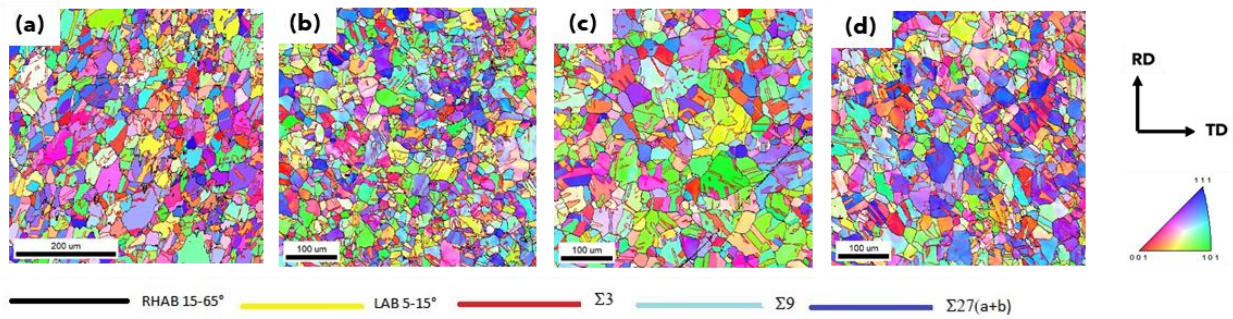
# Effect of cold work on creep deformation behaviour of austenitic stainless steel 304HCu

P. Shruti[a], V. Subramanya Sarma[a], M. Kamaraj[a]

[a] *Department of Metallurgical and Materials Engineering, Indian Institute of Technology, Madras, Chennai, India.*

*E-mail: mm18d022@smail.iitm.ac.in*

SS 304HCu is considered as a candidate material for high temperature (up to 650°C) applications in fossil fuel-based power plants [1]. Apart from having high oxidation and corrosion resistance, addition of copper increases the creep rupture strength [2]. The present work involves studying the influence of cold work on creep deformation behaviour of SS 304HCu. The material was cold rolled to various deformations (5, 10 and 15% reduction in thickness). Characterisation using SEM-EBSD revealed that as the extent of cold work increases, the number fraction and character of various boundaries evolve, as depicted in Figure 1. In order to understand the effect of cold work on creep deformation behaviour, creep tests at 700°C and 150 MPa were carried out for the as received (i.e., solution annealed state) and cold worked material. Subsequently comparison is drawn between the creep deformation behaviour of the material in as received and cold worked condition, in terms of minimum creep rate and rupture life.




*Keywords: Creep, Grain Boundary Engineering, Microstructure, SS 304HCu*

Fig.1 Inverse Pole Figure maps overlapped with high angle, low angle and CSL boundaries for (a) as received and cold rolled for (b) 5% (c) 10% (d) 15%

**References:**

**[1] S.C. Chetal, T. Jayakuamr, A.K. Bhaduri, Materials Research and Opportunities in Thermal (Coal-based) Power Sector Including Advanced Ultra Super Critical Power Plants, Proceedings of Indian National Science Academy, Volume 81(4), 2015, 739-754.**

**[2] T. Hatakeyama, T. Sawada, K. Sekido, K. Hara, T. Kimura, Microstructural factors of the complex creep rate change in 18Cr–9Ni–3Cu–Nb–N steel, Materials Science and Engineering A, Volume 831, 2022, In press.**