
A study on microstructure and mechanical properties of Co66.66Cr16.67V16.67 metastable medium-entropy alloy

Luda Wang^{*1,2}, Yudong Zhang², Haile Yan¹, Benoit Beausir², Claude Esling², Liang Zuo¹, and Xiang Zhao¹

¹Northeastern University [Shenyang] – China

²University of LorraineLEM3 – University of LorraineLEM3 – France

Abstract

Overtuning the traditional alloy design concept, high-entropy alloys (HEAs) or medium-entropy alloys (MEAs) are currently drawing widespread attentions from the materials science community, particularly those with a single phase of face-centered cubic (fcc) crystal structure, due to their superior properties, such as large elongation, good corrosion resistance and exceptional fracture toughness etc. In present work, A new MEA with a nominal composition of 66.66Co-16.67Cr-16.67V (at. %) was designed, which possess single fcc structure after solid solution treated at 1473 K for 2 h. To modify the microstructure, the initial alloy was cold-rolled to a thickness reduction of 70 %, and then heated treated at different temperatures (1000 °C, 1100 °C and 1200 °C) to obtain different microstructures. The recrystallisation behavior and mechanical properties were studied by in-situ synchrotron XRD diffraction, electron back scatter diffraction (EBSD), and transmission electron microscopy (TEM). The results showed that this alloy can undergo phase transformation under thermal treatment or subjected to plastic deformation, thereby significantly affecting the microstructure and mechanical properties.

Keywords: medium entropy alloy, phase transformation, recrystallisation, mechanical behavior

*Speaker