Paragraph Ran in the Queries

Paper Title: Toughness behavior and deformation mechanisms in FCC-based Fe45Co30Cr10V10Ni5-xMnx high-entropy alloys: Insights from instrumented Charpy impact tests

Content :

Microstructures and tensile properties

Fig. 1(a–c) displays EBSD phase maps of the 0Mn, 2.5Mn, and 5Mn alloys, indicating that all three alloys are composed entirely of FCC grains. The average size of the FCC grains (D_{FCC}) in these alloys is approximately 10 μm, as shown within the figures. Fig. 2(a) presents the engineering tensile stress-strain curves of the three alloys at 25 °C and −196 °C, with the measured tensile properties listed in Table 2 [27]. At 25 °C, the yield and tensile strengths and elongation increase with increasing Mn content from 0 to 5 at.%. As the temperature decreases to −196 °C, both yield and tensile strengths increase, while the elongation decreases with increasing Mn content, contrasting with the ductility behavior observed at 25 °C. The 5Mn alloy exhibits the highest tensile strength, exceeding 1.5 GPa, and presents a sigmoidal curve shape. Fig. 2(b) shows the XRD profiles of the three alloys after the tensile test at 25 °C and −196 °C [27]. The volume fraction of FCC (V_{FCC}) was measured by the XRD direct comparison method [5,25,26], with the results shown in Table 2. At 25 °C, V_{FCC} is 100% and 45.6% in the 0Mn and 5Mn alloys, respectively, indicating the occurrence of martensitic transformation to BCC (54.40%) in the 5Mn alloy. At −196 °C, V_{FCC} is 25.7% and 9.8% in the 0Mn and 5Mn alloys, respectively, indicating active martensitic transformation in all the alloys. A comprehensive description of detailed microstructural analyses during tensile tests are presented in the preceding paper [27]. Elevating the Mn content and reducing the mechanical testing temperature result in a more pronounced TRIP effect in the corresponding alloys

Tensile test and volume fraction of FCC (V_{FCC}) data at 25 °C and −196 °C of the 0Mn, 2.5Mn, and 5Mn alloys.

Alloy	Test Temperature (°C)	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	V_{FCC} (%)

0Mn		329 ± 5	695 ± 2	51.7 ± 1.1	100
2.5Mn	25	335 ± 3	736 ± 4	53.5 ± 0.5	99.1
5Mn		356 ± 1	746 ± 2	61.2 ± 0.9	45.6
0Mn		581 ± 5	1223 ± 9	64.4 ± 2.1	25.7
2.5Mn	−196	590 ± 10	1387 ± 11	53.7 ± 2.5	16.2
5Mn		603 ± 6	1554 ± 15	46.6 ± 1.3	9.8