Small punch testing of Fe-Al based alloys with Ti and Nb additions

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Abstract:

Three Fe-Al-based alloys, a binary with 22 at. % of Al, a ternary with 22 at. % of Al and 7 at. % of Ti and a quaternary with 22 at. % of Al, 4 at. % of Ti and 4 at. % of Nb prepared by arc melting to small button type ingots were studied by small punch test and small punch creep test in order to obtain the high temperature tensile and creep properties. Evaluation of the results shows a significantly improved strength at high temperatures and creep resistance of the ternary and quaternary alloys compared to the binary alloy. The observation of the punched discs fracture surfaces related to the initial microstructure also helps to better understanding of the deformation and fracture behavior of these alloys at high temperatures.

Key words:

Small punch test; intermetallics; iron aluminide, creep