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Microstructure and High Temperature Deformation Behavior of Cast 310S Alloy

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Abstract : High temperature deformation behavior of cast 310S stainless steel has been investigated in this study by performing tensile and compression tests at temperatures from 900 to 1200°C. Rectangular ingots of which the dimensions were 350×350×100 in millimeter were cast using vacuum induction melting. Phase equilibrium was calculated using the FactSage®, thermodynamic software and database. Thermal expansion coefficient was also measured on the ingot in the temperature range from room temperature to 1200°C. Tensile strength of cast 310S stainless steel was 9 MPa at 1200°C, which is a little higher than that of a wrought 310S. With temperature decreased, tensile strength increased rapidly and reached up to 72 MPa at 900°C. Elongation also increased with temperature decreased. Microstructure observation revealed that σ phase was precipitated along the grain boundary and within the matrix over 1200°C, which is detrimental to high temperature elongation.

Keywords : stainless steel, STS 310S, high temperature deformation, microstructure, mechanical properties
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