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VIII ВСЕРОССИЙСКАЯ НАУЧНО-ПРАКТИЧЕСКАЯ КОНФЕРЕНЦИЯ С МЕЖДУНАРОДНЫМ УЧАСТИЕМ, ПОСВЯЩЕННАЯ 50-ЛЕТИЮ ОСНОВАНИЯ ИНСТИТУТА ХИМИИ НЕФТИ

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EFFECT OF TANTALUM ON THE TENSILE PROPERTIES OF 12%Cr MARTENSITIC STEELS FOR STEAM BLADES

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Co-modified 12%Cr martensitic steels are perspective materials for steam blades for fossil power plants which are able to work at ultra-supercritical parameters of steam (T=620-650°C, P=25-30 MPa). The microstructure and mechanical properties of two Ta-containing and Ta-free Co-modified 12%Cr martensitic steels subjected to the normalizing at 1050-1070°C and tempering at different temperatures ranging from 750 to 800 °C were studied. After normalizing at 1050-1070°C, the average size of prior austenite grains was 50 ±5 μm; the fraction of δ-ferrite was less than 10%. The tempering temperature strongly affected the tempered martensite/ferrite lath structure in both steels: the lath width increased from 290±30 to 690±50 nm and dislocation density decreased from to 3×10^{14} to 1.5×10^{14} m^{-2} when tempering temperature increased from 750 to 800°C. The addition of Ta in the 12%Cr-3%Co steel provided the precipitation of Ta-rich MX carbonitrides after heat treatment. The tensile tests were carried out at 20°C and 650°C with a strain rate of 2×10^{-3} s^{-1}. Insignificant increment in ultimate tensile strength and yield strength was revealed in Ta-containing 12%Cr steel.

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