

Excellent Combination of Tensile Strength and Elongation of Novel Reverse Rolled TaNbHfZrTi Refractory High Entropy Alloy

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Abstract : In this work, the high-entropy alloy TaNbHfZrTi was processed at room temperature by each step novel reverse rolling up to a 90% reduction in thickness. The reverse rolled 90% samples subsequently used for annealing at 800°C and 1000°C temperatures for 1h to understand phase stability, microstructure, texture, and mechanical properties. The reverse rolled 90% condition contains BCC single-phase; upon annealing at 800°C temperature, the formation of secondary phase BCC-2 prevailed. The partial recrystallization and complete recrystallization microstructures were developed for annealed at 800°C and 1000°C temperatures, respectively. The reverse rolled condition, and 1000°C annealed temperature exhibit extraordinary room temperature tensile properties with high tensile strength (UTS) 1430MPa and 1556 MPa without compromising loss of ductility consists of an appreciable amount of 21% and 20% elongation, respectively.

Keywords : refractory high entropy alloys, reverse rolling, recrystallization, microstructure, tensile properties

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