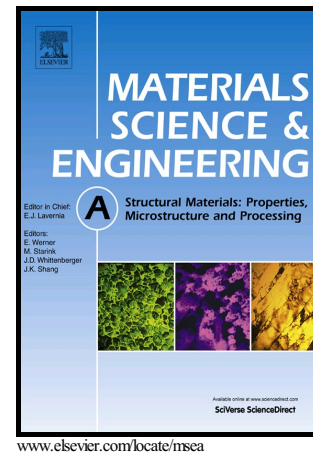


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Ultrahigh-strength CoCrFeMnNi high-entropy alloy wire rod with excellent resistance to hydrogen embrittlement

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Abstract

An ultrahigh-strength CoCrFeMnNi high-entropy alloy wire rod was produced using cryogenic temperature caliber rolling. Because of the highly increased twinning activity caused by lowering the temperature to 77 K, significant twinning-induced grain refinement occurred; thus, an ultrafine (< 100 nm) grain structure could be achieved in the processed material. The processed material showed a remarkably high tensile strength of ~1.7 GPa, and also had excellent resistance to hydrogen embrittlement (HE), in contrast to the typical trade-off relationship between these two properties. The exceptionally high resistance to HE was attributed to the combined effects of (1) difficulties in accumulating hydrogen owing to the sluggish hydrogen diffusion caused by the face-centered cubic crystal structure and the severe

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