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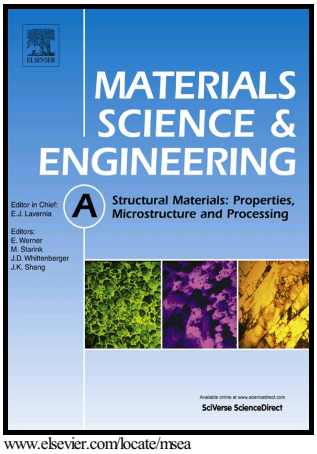

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PII: S0921-5093(18)30890-6
DOI: https://doi.org/10.1016/j.msea.2018.06.086
Reference: MSA36641

To appear in: *Materials Science & Engineering A*

Received date: 17 April 2018
Revised date: 21 June 2018
Accepted date: 22 June 2018

Cite this article as: Young Jin Kwon, Jong Woo Won, Sung Hyuk Park, Jeong Hun Lee, Ka Ram Lim, Young Sang Na and Chong Soo Lee, Ultrahigh-strength CoCrFeMnNi high-entropy alloy wire rod with excellent resistance to hydrogen embrittlement, *Materials Science & Engineering A*, https://doi.org/10.1016/j.msea.2018.06.086

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Young Jin Kwon [a], Jong Woo Won [b,*], Sung Hyuk Park [c], Jeong Hun Lee [d], Ka Ram Lim [b], Young Sang Na [b], Chong Soo Lee [a,*]

[a] *Graduate Institute of Ferrous Technology, Pohang University of Science and Technology, Pohang 37673, Republic of Korea.*

[b] *Metal Materials Division, Korea Institute of Materials Science, Changwon 51508, Republic of Korea*

[c] *School of Materials Science and Engineering, Kyungpook National University, Daegu 41566, Republic of Korea.*

[d] *Advanced Forming Process R&D Group, Korea Institute of Industrial Technology, Ulsan 44413, Republic of Korea*

jwwon@kims.re.kr

cslee@postech.ac.kr

*Corresponding Author: Jong Woo Won Tel.:+82-55-280-3355, Fax.:+82-55-280-3255

*Corresponding Author. Tel.:+82-54-279-9009, Fax.:+82-54-279-9099

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