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Hao Tang, Hui Zhang, Liang Chen, Sheng Guo

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**Novel Laser Rapidly Solidified Medium-Entropy High Speed Steel Coatings
with Enhanced Hot Wear Resistance**

Hao Tang,^a Hui Zhang,^{a,b,1} Liang Chen,^a and Sheng Guo^c

^a *School of Materials Science and Engineering, Anhui University of Technology,
Ma'anshan 243002, Anhui, P. R. China*

^b *State Key Laboratory of Solid Lubricating, Lanzhou Institute of Chemical Physics,
Chinese Academic of Science, Lanzhou 730000, Gansu, P. R. China*

^c *Department of Industrial and Materials Science, Chalmers University of Technology,
SE-41296, Gothenburg, Sweden*

Abstract: The microstructure and hot wear resistance of a laser clad novel medium-entropy high speed steel (ME-HSS) coating, by increasing the content of alloying elements Mo, V, Co, Ni and Al in a commercialized W6Mo5Cr4V2 (M2) HSS, are studied here. The results show that the newly designed ME-HSS coating has less amount of undesired retained austenite, and enhanced secondary hardening effect with more nano-size M_2C carbide precipitates after tempering, in comparison with the M2 coating. In particular, the tempered ME-HSS coating exhibits excellent oxidative wear resistance at 500 °C because of the high content of anti-oxidation elements like Co, Ni and Al, leading to the formation of a more continuous and compact oxidation film on its worn surface.

Keywords: High speed steel; medium entropy alloy; hot wear resistance; laser cladding

¹ Corresponding author. E-mail: huizhang@ahut.edu.cn

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