Study on high-temperature oxidation behavior of nanocrystalline coatings in an atmosphere containing water vapor

Chang Gong[1], Wenyao Sun[1], Minghui Chen[2], Jinlong Wang[2], Fuhui Wang[1,2]

[1]*Materials Science & Chemical Engineering College, Harbin Engineering University, Harbin 150001, China*

[2]*Shenyang National Laboratory for Materials Science, Northeastern University, Shenyang 110819, China*

Presenter's e-mail address: 973562585@qq.com

Abstract*:* Ni-based super alloy and its sputtered nanocrystalline coating prepared by magnetron sputtering were oxidized in O_2 and O^{2+}20%H_2O environment at 900 °C. The kinetics of oxide formation in the presence of water vapour were discussed and compared with oxidation in dry atmospheres. The oxidation rates were decreased by the presence of water vapour. Scale morphology and phase composition are also influenced by water vapour.

Keywords: nanocrystalline coating, water vapor, high-temperature oxidation

Reference

[1] Guo, H., et al., High-temperature oxidation and hot-corrosion behaviour of EB-PVD β-NiAlDy coatings. Corrosion Science, 2011. 53(3): p. 1050-1059.

[2] Guo, H., et al., Improved cyclic oxidation resistance of electron beam physical vapor deposited nano-oxide dispersed β-NiAl coatings for Hf-containing superalloy. Corrosion Science, 2010. 52(4): p. 1440-1446.

[3] PRESCOTT, R. and M.J. GRAHAM, The formation of aluminum oxide scales on high-temperature alloys. Oxidation of metals, 1992. 38(3-4): p. 233-254.