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References 1. Tian Zhang, et al., Corrosion Science, 66(2013): 59-66. 2. Jian He, et al., Corrosion Science, 77(2013): 322-333. 3. Dongqing Li, et al., Corrosion Science, 66(2013): 125-135. 4. Hongbo Guo, et al., Corrosion Science, 78(2014): 369-377. 5. Di Wang, et al., Corrosion Science, 78(2014): 304-312.

THE ROLE OF REACTIVE ELEMENTS IN IMPROVING THE CYCLIC OXIDATION PERFORMANCE OF β-NiAl COATINGS

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β-NiAl has been considered as one of potential candidates for the protective coatings of superalloys and the bond coat in thermal barrier coating (TBC) system. However, the oxide scale grown on NiAl spalls readily during high-temperature cyclic oxidation. Reactive elements (REs) as well as their oxides dispersions were investigated to improve the cyclic oxidation performance. In this work, the effects of several REs on the adherence of Al_2O_3/NiAl interface were investigated by first principles theory calculations and experiments. We find that the solubility of the REs in NiAl alloy arrive at an order of Hf >Zr>Dy>Y>La, all the REs exhibit an affinity for sulfur, with an order of La>Dy>Y>Zr>Hf, and direct effects of the REs on the Al_2O_3/NiAl interface exhibit an order of Hf>Y>Hf>Zr>clean interface>La. Combined with experimental results, we provide some suggestions on how to choose an appropriate RE. Co-doping of appropriate REs exhibits promising potential in improving the oxide scale adherence but also in reducing the growth rate of the oxides formed on the NiAl alloy or coating as compared to the single RE doping.

Keywords: Reactive element (RE); Oxidation; Thermal barrier coating; Metallic coating; Interface.

References

1. Tian Zhang, et al., *Corrosion Science*, 66(2013): 59-66.
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