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# Microstructure and oxidation behavior of Al + Cr co-deposited coatings on nickel-based superalloys

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## Abstract

The microstructure and oxidation behavior were investigated in Al and Cr co-deposited diffusion coatings prepared by the pack cementation process. The composition (in wt.%) of the packs was $3NH_4Cl$-xAl-(25-x)Cr-$72Al_2O_3$ with different Al levels (x = 0.5, 1.2, 4, and 10). After the heat-treatment process, the corresponding microstructure of the coatings was Cr + $Cr_2Ni_3$ + Al-rich phase, Cr + $Cr_2Ni_3$, Cr + NiAl + $Ni_3Al$ and NiAl + $AlCr_2$, respectively. The isothermal oxidation tests were performed at 950℃ for up to 100 h in air, and the oxidation kinetic curves were obtained. It indicated that the coatings formed in the packs containing 1.2 wt.% Al had the lowest weight gain, while the weight gain of the coating formed in the packs having 4 wt.% Al was the largest. The presence of Cr in Al and Cr co-deposited coatings promotes $Al_2O_3$ generation. The formation mechanisms of Al + Cr co-deposited coatings and the effect of Cr in different types of coatings during the oxidation process were discussed.

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