Study on Corrosion Behavior of a Newly Ni-based Superalloy in the Environment of High Temperature Coal-Ash / Flue-Gas

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Abstract The corrosion behavior of a Newly Ni-based superalloy was studied in environments of synthetic coal-ash and synthetic flue-gas at 650 °C and 700 °C for 500h comparatively. The corrosion kinetics, morphologies, compositions and phases of the corrosion products were characterized by means of SEM, EDS, and XRD, respectively. The results indicated that the temperature is acritical factor in the formation of corrosion layer for the newly Ni-based superalloy. The common denominator is that a dense and uniform layered oxide scales consisting of a Fe_2O_3 outer layer and an Cr_2O_3 and Al_2O_3 inner layer were observed at both 650 ºCand 700 ºC. The 700 °C high-temperature is the primary cause of the formation of the convex corrosion products and internal sulfide MxSy (M: Cr, Mo). The corrosion mechanism of the newly Ni-based superalloy was also discussed based on the experimental results.

Keywords Ni-based; Coal ash/Flue gas; Corrosion; High temperature

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