contaminants from wire drawing and weaving processes, exposure of reactive crystal orientation sites and a chemically receptive surface.

Conclusions

This study has shown that, in the ammonia oxidation process, the surface of an operational catalyst is metallic in nature, not oxide-covered as previously thought. The catalytic process is distinct from oxide build-up as the result of a gradual deactivation process and from material loss by volatilisation, as PtO_2.

Further, the effects of various catalyst pretreatments have been studied. A successful pretreatment has been shown to produce a generally clean, chemically receptive surface, with the exposure of reactive crystal orientation sites.

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Platinum Modified Aluminide Coatings

The widespread use of gas turbine engines for industrial, marine and aero applications has resulted from many developments which, over a period of some forty years, have improved engine performance and service life. This evolution is continuing and several previous articles in this journal have considered how the turbine blades can be further improved, particularly by using protective coatings (1, 2, 3).

The addition of platinum to aluminide coatings has been found to be beneficial, improving the resistance of nickel-base superalloys to oxidation and hot corrosion. However, the protective mechanism is not fully understood and the available data is somewhat limited.

A recent contribution to the literature reports on an investigation carried out at the Naval Postgraduate School, Monterey, California (4). Platinum modified and unmodified aluminide coatings on substrates of IN-738, a commercial nickel-base superalloy, have been subjected to cyclic oxidation conditions at a temperature of 1100°C for up to 250 hours, and the effects on microstructure and surface topology studied.

With both types of diffusion coating, surface upheavals were observed, this rumpling being greater on the platinum modified coatings. Factors considered to influence the amount of rumpling included thermal expansion mismatch, thermal gradient across the coated specimens and the mechanical properties of the coating. While the thickness of the coating did have an effect, it was pointed out that for coatings formed by diffusion, different thicknesses of coating also have different compositions. Thus it was concluded that the rumpling is not due to subcoating melting, but to a complex combination and interaction of variables.

While the unmodified aluminide coatings exhibited spalling of the oxide, all the platinum modifield coatings exhibited excellent adherence of the oxide, regardless of coating structure and composition.

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