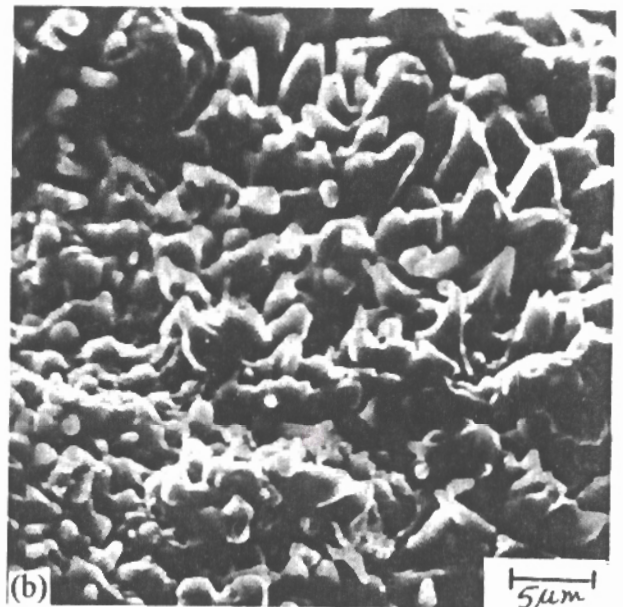
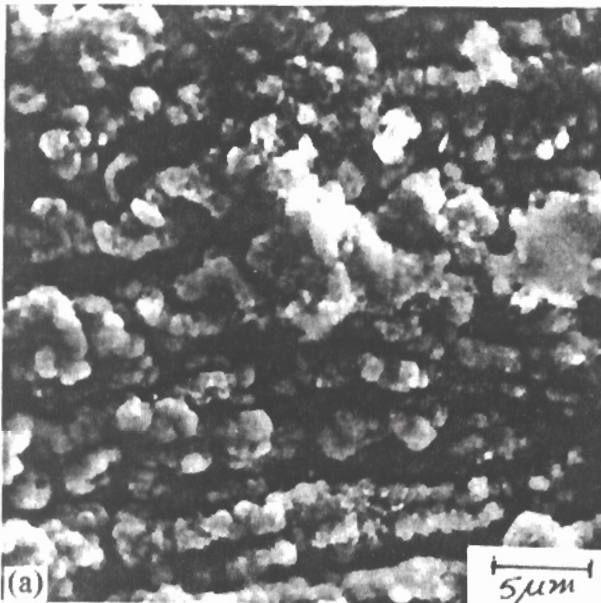


# THE EFFECT OF SURFACE ADDITION OF RARE EARTH OXIDES ON HIGH TEMPERATURE OXIDATION BEHAVIOR OF FE-18CR-8NI STAINLESS STEELS

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The Influence of adding small quantities of certain oxygen reactive elements such as Ce, Y, Zr and others to high temperature alloys on improvements in oxidation rate and oxide scale adhesion is well documented. However most of the effort has concentrated on adding rare earth (RE) elements either in metallic form or as oxides to the alloy. This paper evaluates the effect of superficial addition of various RE oxides and their concentrates on the oxidation behavior of Fe-18Cr-8Ni. The influence of surface addition of oxides of Ce, Nd, La, Sm, Gd, and Y as well as oxide concentrates of Ce and Y ( $\cong 70\% Y_2O_3$ ) to Fe-18Cr-8Ni on isothermal oxidation behavior at  $1000^\circ C$  and cyclic oxidation behavior between  $20^\circ$  and  $900^\circ C$  has been studied. The isothermal oxidation curves revealed significant improvements in oxidation resistance of the alloy specimens coated with RE oxides and Y was found to be the most efficient. Cyclic oxidation resistance which reflects the adhesion of the oxide also improved with RE oxides. The increased oxidation resistance can be attributed to the formation of rounded grains of  $Cr_2O_3$  on the RE oxide coated specimens as compared to the needlelike Fe oxides on the uncoated specimens, shown in micrographs (a) and (b). The use of Ce and Y oxide concentrates which contain other RE oxides, results in only partial improvement in the oxidation resistance and this behavior is accompanied by only a partial change in the oxide morphology wherein both rounded  $Cr_2O_3$  and needlelike  $Fe_2O_3$  are present.



Scanning electron micrographs of (a) Ce oxide coated and (b) uncoated specimens of Fe-18Cr-8Ni oxidised at  $1000^\circ C$  for 20h. Micrograph (a) reveals  $Cr_2O_3$  and micrograph (b) iron oxides.