The Effect Of Substrate Microstructure On High Temperature Oxidation Of Zr Alloy

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ABSTRACT

Specimens with various substrate microstructures of Zr-2.5Nb, Zircalloy 4 and pure Zr have been oxidized at 500C in air. Oxidation kinetics is measured and the microstructures of both oxide and substrate are analyzed. The difference in oxidation kinetics among various specimens is significant. This difference is explained by the distribution of oxide grain size, grain shape and grain boundary, which are controlled by substrate grain size and β phase distribution. The previously proposed model of Zr oxidation is used to predict oxidation kinetics and oxide microstructure from substrate microstructure. Computer simulation based on the model is performed and simulation results are compared with the experimental results.