**Interconnect Lifetime Prediction from Interfacial Indentation**

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The interfacial strength between the oxide scale and the substrate is crucial to the reliability and durability of the metallic interconnect in SOFC operating environments. An integrated experimental/analytical methodology for quantifying the interfacial strength between the oxide scale and metallic interconnect materials has been developed, and a modeling tool that aims to predict the life of interconnect candidate materials under typical SOFC operating conditions has been established. In this work, a model based on experimental data from interfacial nano and micro indentation is used to predict the interconnect lifetime under isothermal cooling conditions. The model considers buckling driven blistering of oxide scale on the interconnect surface as the main failure mechanism. The energy release rate, *G,* for buckling driven blistering of oxide scale was found to be a function of the scale thickness and the thermal stress due to the cooling after stack operation. The material interface toughness, , was found as a function of fracture mode mixity and , the Mode I stress intensity factor determined from the interface nano/microindentation experiments that evaluate the length of crack propagation along the oxide-metal interface as a function of applied load. The critical oxide thickness was then determined from the failure criterion, . Finally, the lifetime can then be defined from the oxidation kinetics and the critical thickness. Based on the experimental measurement of for 441SS at 800°C, the current model predicts the critical scale thickness in the range of to . Additional testing to validate the methodology is in progress.