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Segregation of impurities at γ' (L12) / γ (fcc) interfaces in a Ni-based superalloy DE NYAGO TAFEN, MICHAEL GAO, National Energy Technology Laboratory, 1450 Queen Ave SW, Albany, OR 97321, USA; URS Corporation, P.O. Box 1959, Albany, OR 97321, USA — One of the most technologically advanced energy conversion devices is the gas turbine used in aerospace jet engines and gas- fired land-based turbines for electricity generation, fabricated from Ni-based superalloys. However, these materials lack of long- term mechanical and microstructure stability, which is largely due to an excessive coarsening of γ' that can cause substantial loss of creep resistance and mechanical instability at high temperatures. Theoretical prediction of the creep rate of these important compounds is very imperative, but yet is extremely challenging. Interfacial energy is one of the most important factors that control the coarsening kinetics of these important phases. It indirectly determines the creep resistance of the alloy through the coarsening rate of the strengthening precipitate phase. In this talk, we will present the results of various γ'/γ interfaces of a Ni-based superalloy obtained using DFT calculations. Then, we will discuss the segregation of impurities at these interfaces. Minor alloying elements in superalloys can alter the interfacial energy between γ and γ', and change the strength behavior of the alloy. Alloying elements or impurity species can segregate to interfaces. A favorable segregation would result in enhancing the interfacial cohesion and thus lower the energy.

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