

Effect of the impurity on diffusion creep of dilute Cu-based solid solutions

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We analyzed change in diffusional creep polycrystalline copper, depending on the impurities dissolved therein. Data were used on strain rate at high temperatures ($> 0.85T_m$) and low stresses (< 0.5 MPa), obtaining in zero creep experiments. In dilute solutions, the creep depends on the surface activity of the impurities and their ability to affect the bulk diffusion of alloy. In general, at low concentrations of surface active impurities creep rate falls. This is due to a decrease in the effectiveness of interfaces (free surfaces and grain boundaries) as sources and sinks of vacancies. Increasing the concentration of the second component leads to change in the rate of bulk diffusion of solid solution. Accelerating the bulk diffusion entails a reduction in the viscosity, slowing down - increase viscosity. Thus, the diffusion creep in dilute solid solutions can be accelerated with increasing concentration, decelerated and had extreme behavior (decrease and then increase the creep rate).