

Thermal Stresses in Two - Phase Systems

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X-ray stress analysis was used to study the evolution of thermal stresses in the individual phases of a Cu-W sample. The measured lattice strain values contained contributions from eigenstrains (due to thermal expansion) and elastic strains (arising from mutual constraint of grains of different phases). The elastic lattice strains were of two types: 1- strains arising due to the difference of the coefficients of thermal expansion of the two phases and 2-the compatibility strains arising from the differences of elastic moduli of the two phases in response to the differential deformation between phases. A numerical simulation of the experiment, modelling the expected contributions from these sources will also be presented, and the discrepancies between the modelled and experimental strain profiles will be discussed.