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Evidence for Conditioning as a Progenitor of Double-C Transformation Mechanisms in Pu-Ga Alloys.[1] J.R. JEFFRIES, K.J.M. BLOBAUM, M.A. WALL, A.J. SCHWARTZ, Lawrence Livermore National Laboratory — By alloying Pu with Ga, the fcc δ phase can be retained down to room temperature. This metastable δ phase is realized due to slow Ga diffusion, which prevents the δ phase from decomposing into the equilibrium mixed phase structures. The metastable δ phase in a Pu-1.9 at.% Ga alloy, however, does yield to chemical driving forces by undergoing the $\delta \rightarrow \alpha$' isothermal martensitic transformation below $M_s \approx$ -100 $^\circ$C. This transformation exhibits poorly understood double-C behavior in the time-temperature-transformation diagram. Recently, a "conditioning" treatment—which entails isothermally holding a specimen at sub-anneal temperatures but above M_s —has been shown to dramatically affect the amount of α' phase formed at low temperature. We report evidence that the conditioning treatment induces the lower-C of the double-C curve, and we implicate the classical nucleation of equilibrium phases as the underlying mechanism behind conditioning in Pu-Ga alloys.

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