

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Transient nucleation in a Zr-Ti-Cu-Ni-Al metallic glass¹ Y. T. SHEN, K. F. KELTON, Dept. of physics, Washington University, St. Louis — Upon annealing Zr-Ti-Cu-Ni-Al bulk metallic glasses (BMG) crystallize to a nano-quasicrystal/amorphous composite. To probe the nucleation processes that underlie this microstructure formation we have determined the nucleation rate as a function of temperature, employing the two-step annealing method commonly used in silicate glasses. Samples were first annealed at temperatures where the nucleation rates were high, but the growth rates were low to produce a population of nuclei. These were subsequently grown to an observable size for transmission electron microscopy study by annealing at a higher temperature where the nucleation rate is small. We present the first quantitative time-dependent nucleation data obtained for a metallic glass by this method. The data are analyzed in terms of the classical theory of nucleation and an extended kinetic model that includes the coupling between the interfacial attachment and long-range diffusion fluxes.

¹Supported by National Science Foundation under grant DMR 03-07410

Youtao Shen
Dept. of physics, Washington University, St. Louis

Date submitted: 30 Nov 2005

Electronic form version 1.4