Medium-Range Structure in Al-based Amorphous Metals from Fluctuation Electron Microscopy
PAUL VOYLES, University of Wisconsin, Madison

High-Al content amorphous metals formed by rapid quenching devitrify to nanometer-sized Al nanocrystals in an amorphous matrix at remarkably high nanocrystal density ($>10^{20}$ m$^{-3}$). We have found nanoscale, Al-like order in rapidly quenched amorphous Al$_{92}$Sm$_8$ using fluctuation electron microscopy, a quantitative TEM technique uniquely sensitive to nanoscale order in amorphous materials. This order is not found in Al$_{92}$Sm$_8$ amorphized by mechanical deformation, which also does not devitrify to the nanocrystal / matrix microstructure.

The nanoscale order in the rapid-quenched samples is reduced by thermal annealing, suggesting that fluctuation microscopy is measuring sub-critical Al clusters retained during the quench.