# Large Scale Processing of Nanocrystalline Cu-10 at% Ta by Cryogenic Attrition

**A.J. Roberts, A.K. Giri, B. C. Hornbuckle, K.A. Darling**
**Army Research Laboratory, Aberdeen Proving Ground, MD 21005**

## Abstract

ARL has recently invested in significant infrastructure to move from laboratory scale to large scale synthesis of stabilized nanocrystalline metal powder feedstocks. This article deals with the scale-up synthesis, using a processing method proving to be extend to industrial scale manufacturing. Findings indicate lower energy attritor milling in liquid Ar successfully produces ~ 1kg of powder feedstock. Analysis and results of the characteristics, in both mechanical hardness and high temperature microstructural stability. These advancements are providing a path forward to full scale consolidation, mechanical testing and characterization (e.g., tension, fatigue, creep, shock and ballistic evaluation) of these materials, which has typically not been feasible for this class of material.