

Powder Metallurgy Fabrication of Thin, Flat Molybdenum Disks

R.A. Lowden, J.O. Kiggans, Jr., and C. Bryan

Materials Science and Technology Division

Oak Ridge National Laboratory, One Bethel Valley Rd., Oak Ridge, TN 37831 – U.S.A.

ABSTRACT

Powder metallurgy approaches for the fabrication of accelerator target disks are being examined to support the development of Mo-99 production by NorthStar Medical Technologies, LLC. An advantage of powder metallurgy is that very little material is wasted and at present, dense, quality parts are routinely produced from molybdenum powder. The proposed targets, however, are thin wafers, 29 mm in diameter with a thickness of 0.5 mm, with very stringent dimensional tolerances. Although tooling can be machined to very high tolerance levels, the operations of powder feed, pressing and sintering involve complicated mechanisms, each of which affects green density and shrinkage, and therefore the dimensions and shape of the final product. Combinations of powder morphology, lubricants and pressing technique have been explored to produce target disks with minimal variations in thickness and little or no distortion. In addition, sintering conditions that produce densities for optimum target dissolvability are being determined.