

Abstract Submitted
for the SHOCK07 Meeting of
The American Physical Society

Fabrication of W-Cu/Mo-Cu functionally graded materials by explosive consolidation PENGWAN CHEN, ZHIMING JIANG, Beijing Institute of Technology, WEIPING SHEN, Beijing University of Science and Technology, JUN YANG, FENGLI HUANG, Beijing Institute of Technology — Attempts are made to use explosive consolidation to fabricate high quality W-Cu/Mo-Cu FGMs. Tungsten powder with 99% purity and a particle size of $3\sim 25\mu\text{m}$ and molybdenum/copper powder with $\geq 99\%$ purity and a particle size of $74\mu\text{m}$ are used as starting powder. A novel technique, called bidirectional underwater shockwave explosive consolidation, is developed. Two water chambers are placed in both sides of the sample. Detonation-generated shock waves are attenuated by the water chambers before acting on the samples. Through adjusting the height of the water columns, the applied pressure can be adjusted. A self-propagating reaction system is used to provide temperature compensation and to enhance consolidation quality. Flash X-ray photography is used to observe the process of explosive consolidation. Various techniques are used to characterize the recovered samples including optical microscopy, scanning electron microscopy (SEM), X-ray diffraction (XRD), energy spectrum analysis, hardness measurement and density measurement. The explosive consolidation methods developed in the paper can be used to other hard-to-consolidate powder materials.

Pengwan Chen
Beijing Institute of Technology

Date submitted: 16 Feb 2007

Electronic form version 1.4