Phase Relations and Phase Evolution in the Ba-Y-Cu-F-O-H_2O System

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Applied Superconductivity Conference
Jacksonville, FL
October 3–8, 2004

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prepared by
CONDENSED MATTER SCIENCES DIVISION
OAK RIDGE NATIONAL LABORATORY
Managed by
UT-BATTELLE, LLC
under
Contract No. DE-AC05-00OR22725
with the
U.S. DEPARTMENT OF ENERGY
Oak Ridge, Tennessee

March, 04

Abstract submitted for the 2004 Applied Superconductivity Conference, Jacksonville, Florida, October 3-8, 2004.

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The *ex situ* BaF_2 process is currently one of the most promising processes for producing high quality, long length Ba_2YCu3O_{6+x} (Y-213) superconductor tapes. Metal-organic deposition (MOD) or physical vapor deposition (PVD) techniques typically used to produce the precursor films on rolling-assisted biaxially textured metal substrates (RABiTS), followed by post-annealing in the presence of water vapor. The phase evolution and phase equilibria of Y- 213 in the multi-component Ba-Y-Cu-F-O-H_2O system, however, are not completely understood. For example, the role of $Ba(OH)_2$ in the presence of low-temperature melt needs further investigation. High-temperature x-ray diffraction (HTXRD) experiments together with the transmission electron microscopy (TEM) can provide critical information on phase evolution of Y-213 during the BaF_2 post annealing process. Combined studies using HTXRD and TEM have been conducted on films prepared with amorphous precursors of (BaF_2+Y+Cu), and (BaF_2+YF_3+Cu). This paper will discuss our recent phase equilibria and phase formation investigations.