PHASE EVOLUTION OF $Ba_2YCu_3O_{6+x}$ IN THE Ba-Y-Cu-F-O-OH SYSTEM

W. Wong-Ng, I. Levin, M.D. Vaudin, L.P. Cook, J.P. Cline, Ceramics Division, NIST, Gaithersburg, MD 20899; and R. Feenstra, Condensed Matter Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831.

Currently, one of the most promising methods to produce long length $Ba_2YCu_3O_{6+x}$ (Y-213) coated-conductor is the "*ex situ* BaF_2 process". This process involves the use of e-beam co-evaporated BaF_2-Y-Cu-precursor films on rolling-assisted biaxially textured metal substrates (RABiTS), followed by post-annealing in the presence of water vapor. Although the overall reaction has been determined to be

$$2\ BaF_2 + ½\ Y_2O_3 + 3\ CuO + 2\ H_2O(g) \rightarrow Ba_2YCu_3O_{6.5} + 4\ HF(g),$$

the phase evolution and phase equilibria of the Y-213 phase in the multi-component Ba-Y-Cu-F-OH system are not completely understood. High-temperature x-ray experiments can provide critical information on phase evolution of Y-213 during the BaF_2 post annealing process, and have been conducted on amorphous precursor BaF_2-Y-Cu films prepared using the e-beam evaporation technique. A theta-theta geometry x-ray diffractometer equipped with a custom-designed vacuum and gas flow system was used for this study. With the recently installed position-sensitive-detector and the LABView software system for data collection, phase formation study of Y-213 and BaF_2 from amorphous precursor films in the presence of water vapor was conducted. This paper will discuss our recent results using the amorphous films of the BaF_2-Y-Cu-O system and subsystems prepared at Oak Ridge National Laboratory.