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Real time optical observation of precursor phases during YBCO thin film growth GERTJAN KOSTER, Stanford University, JEONG-UK HUH, ARTURAS VAILIONIS, ROBERT HAMMOND, THEODORE GEBALLE, MALCOLM BEASLEY, Stanford University — We report on our findings using real-time Fourier Transform Infrared (FTIR) radiance and reflectance measurements during high rate electron beam deposited [100 angstroms/sec] YBa2Cu3O7 (YBCO) films [1]. The data can best be explained by assuming the presence of a liquid or glassy phase from which the YBCO crystal grows [2]. We have found that the optical properties of the as deposited material change dramatically upon absorption of oxygen. It is inferred from the strong thin film interference fringes which appear in the reflectance spectrum. The fringes subsequently change amplitude when YBCO precipitates from the liquid; the rate of precipitation can be controlled by oxygen pressure and substrate temperature. The nature of the liquid or glassy phase is studied by XPS and XRD on quenched films at various stages. Subsequently, YBCO nucleation and growth is monitored ex situ by real time x-ray scattering using an ambient controlled hot stage.

[1] G. Koster, J-U. Huh, R.H. Hammond and M.R. Beasley, in preparation.
[2] T. Ohnishi, J.-U. Huh, R.H. Hammond and W. Jo, 2004 *J. Mater. Res.* **19** 977; A. Kursumovic *et al.*, Supercond. Tech. & Sci. 17 (2004) 1215

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