

Phase Transformations During the Reaction Heat Treatment of Nb₃Sn Superconductors

C. Scheuerlein¹, M. Di Michiel², L. Thilly³, F. Buta⁴, X. Peng⁵,
E. Gregory⁶, J. A. Parrell⁷, I. Pong¹, B. Bordini¹, M. Cantoni⁸

¹European Organization for Nuclear Research (CERN), 1211 Geneva 23, Switzerland

²European Synchrotron Radiation Facility (ESRF), 38000 Grenoble, France

³University of Poitiers, 86962 Futuroscope, France

⁴University of Geneva, 1211 Geneva 4, Switzerland

⁵Hyper Tech Research Inc., Columbus, OH, 43210, USA

⁶Supergenics LLC I, Jefferson, MA, 01522, USA

⁷Oxford Superconducting Technology, Carteret, NJ, 07008, USA

⁸Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Corresponding author: Christian.Scheuerlein@cern.ch

Abstract - The evolution of Nb containing phases during the diffusion heat treatment of three different high critical current Nb₃Sn strand types is compared, based on synchrotron X-ray diffraction results that have been obtained at the ID15 beam line of the European Synchrotron Radiation Facility (ESRF). In all strands studied, Nb₃Sn formation is preceded by the formation of a Cu-Nb-Sn ternary phase, NbSn₂ and Nb₆Sn₅. As compared to the PIT and Tube Type strand, the amount of these phases formed in the RRP strand is relatively small. In the RRP strand subelements with a fine filament structure Nb₃Sn grows more quickly, thereby preventing to a large extent the formation of the other higher tin phases.

IEEE/CSC & ESAS EUROPEAN SUPERCONDUCTIVITY NEWS FORUM (ESNF), No. 11, January 2010

Published in *Journal of Physics Conf. Series (SuST)* 234, 022032 (2010)