

TOF-SIMS ANALYSIS OF HYDROGEN IN NIOBIUM, FROM 160°K TO 475°K

P. Maheshwari, A.D. Batchelor, D.P. Griffis, F.A. Stevie, C. Zhou [NCSU AIF, Raleigh, North Carolina, USA]
G. Ciovati, R. Myneni [JLAB, Newport News, Virginia, USA]
M. Rigsbee [Materials Science and Engineering, Raleigh, USA]

Abstract

Niobium (Nb) is the material of choice for superconducting radio frequency (SRF) cavities due to its high critical temperature and critical magnetic field. Interstitial impurity elements such as H directly influence the efficiency of these cavities. Quantification of H in Nb is difficult since H is extremely mobile in Nb with a very high diffusion coefficient even at room temperature. In the presented work, Time of Flight Secondary Ion Mass Spectrometry (TOF-SIMS) was used to characterize H in Nb over a wide temperature range (160°K to 475°K) in situ to check for changes in mobility. Multiple experiments showed that as the specimen temperature is decreased below 300 °K, the H/Nb intensity changes by first increasing and then decreasing drastically at temperatures below 200°K. As specimen temperature is increased from 300°K to 450°K, the H/Nb intensity decreases. Remarkably, the H intensity with respect to Nb increases with time at 475°K (approximately 200°C). Correlation between this data and the H-Nb phase diagram appears to account for the H behaviour.

**CONTRIBUTION NOT
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