

SEMINAIRE SACM

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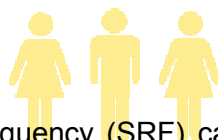
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Some On-going R&D Activities on Niobium at Jefferson Lab



Niobium (Nb) Superconducting Radio Frequency (SRF) cavities are the indispensable parts of the Jefferson Lab's continuous electron beam accelerator facility (CEBAF). The performance of Nb SRF cavities relies critically on their surface properties. A Surface Science Lab (SSL) has been established¹ at Jefferson Lab to study the surfaces of SRF cavities in general and Nb surfaces in particular. A better understanding of Nb surfaces prepared by various techniques and procedures in terms of texture, morphology, surface oxide layer structure, defect, impurity, and level of tolerable contamination will enable us to make cavities with highest performance and reproducibility at the lowest possible cost.

In this talk, I will give a very brief introduction to free electron laser (FEL)/CEBAF at Jefferson Lab and SSL, showing the capabilities of our surface analytical systems and what they can do to help us understand Nb surfaces better. I will summarize up the major challenges that the SRF community is facing from surface science viewpoints. Some examples of the on-going surface R&D activities on Nb at Jefferson Lab such as, for instance, buffered electropolishing² on Nb, study of surface oxide layer structure of Nb using a secondary ion mass spectrometry (SIMS)³, surface treatments of Nb via gas cluster ion beam technique⁴, study of the low temperature baking effect by scanning field emission microscope and SIMS, and the first attempts of surface cross-section observation of Nb employing transmission electron microscope will be shown and discussed.

1. A.T. Wu, Proc. of 11th Workshop on SRF Germany, (2003) ThP13
2. A.T. Wu et al, Applied Surface Science 253 (2007) 3041-3052
3. A.T. Wu, Physica C 441 (2006) 79-82
4. D.R. Swenson and A.T. Wu et al, Proc. of 19th International Conference on the Application of Accelerators in Research and Industry Texas, USA (2006)

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