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Record Gradients of 50 MV/m in TESLA SRF Cavities via Modified Low T Bake. DANIEL BAFIA, Illinois Institute of Technology, ANNA GRASSELLINO, ALEXANDER ROMANENKO, ZUHAWN SUNG, Fermi National Accelerator Laboratory, JOHN ZASADZINSKI, Illinois Institute of Technology — This poster will discuss the modified low temperature bake capable of giving unprecedented accelerating gradients above 50MV/m for 1.3GHz TESLA-shaped niobium SRF cavities in CW operation. A puzzling bifurcation in vertical test results is observed after retesting cavities without disassembly in between, yielding performance that ranges from exceptional to above state-of-the-art. Atomic Force Microscopy studies on cavity cutouts give a possible mechanism responsible for this branching in performance, namely, the dissociation and growth of previously unobserved room temperature niobium nano-hydrides that exist near the RF surface. Such nano-hydrides are made superconducting only through the proximity effect. In-situ low temperature baking of cavity cutouts reveals a dissociation of these room temperature nano-hydrides. These results explain the improved performance of cavities subject to similar in-situ heating in the dewar prior to RF testing.

Daniel Bafia
Illinois Institute of Technology

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