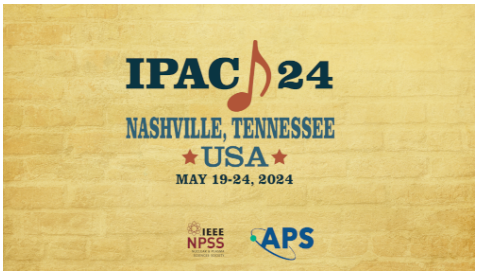

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Decoupling of nitrogen and oxygen impurities in nitrogen doped SRF cavities

Wednesday, 22 May 2024 16:00 (2 hours)

The performance of superconducting radiofrequency (SRF) cavities is critical to enabling the next generation of efficient, high-energy particle accelerators. Recent developments have focused on altering the surface impurity profile through in-situ baking, furnace baking, and doping to introduce and diffuse beneficial impurities such as nitrogen, oxygen, and carbon. However, the precise role and properties of each impurity are not well understood. In this work, we attempt to disentangle the role of oxygen and nitrogen impurities through time-of-flight secondary ion mass spectrometry of niobium samples baked at temperatures varying from 75-800℃ with and without nitrogen injection. From these results, we developed treatments recipe that decouple the effects of oxygen and nitrogen in doping treatments. Understanding how these impurities and their underlying mechanisms drive further optimization in the tailoring of impurity profiles for high performing SRF cavities.

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