22ND INTERNATIONAL CONFERENCE ON RF SUPERCONDUCTIVITY
September 21-26, 2025

Contribution ID: **299** Contribution code: **MOP17** Type: **Poster Presentation**

In-situ HRTEM monitoring of oxide layer decomposition and lattice defect evolution on Nb during Medium-T Baking

Monday 22 September 2025 14:30 (3 hours)

Medium-temperature baking (Medium-T Baking) has emerged as a key technique for enhancing SRF cavity performance, with multiple studies attributing its efficacy to oxide decomposition and oxygen diffusion. In-situ high-resolution transmission electron microscopy (HRTEM) enables real-time, atomic-scale visualization of dynamic structural changes, providing an ideal platform for probing Nb oxide layer dynamics during baking.

Our previous in-situ HRTEM measurements at 350 ℃ heating showed emergent 'white dots' and local contrast variations that revealed nanoscale lattice transformations. Recently, we utilized on-site vacuum storage to avoid cross-section sample oxidation post-FIB processing, which enabled us to single out the oxide layer for both HRTEM and energy-dispersive X-ray spectroscopy (EDS) to obtain definitive evidence of its decomposition during heating. We also detected interstitial oxygen diffusion-induced lattice defects via HRTEM.

Preliminary results showed that the observed defects may enhance cavity performance, and further vertical tests are underway to fully elucidate the underlying mechanisms.

I have read and accept the Privacy Policy Statement

Yes

Footnotes

Funding Agency

Author: HE, Yuan (Institute of Modern Physics, Chinese Academy of Sciences)

Co-authors: LUO, Didi (Institute of Modern Physics, Chinese Academy of Sciences); TAN, Teng (Institute of Modern Physics); CHEN, Shantong (Institute of Modern Physics)

Presenter: HE, Yuan (Institute of Modern Physics, Chinese Academy of Sciences)

Session Classification: Monday Poster Session

Track Classification: MC2: Fundamental SRF research and development