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Cu-based Nb₃Sn QPR sample preparation via ETS bronze route

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Copper-based Nb₃Sn cavity is a promising candidate for next generation accelerator applications in the field of superconducting radio frequency (SRF). It combines the excellent thermal conductivity of copper and the superior superconducting properties of Nb₃Sn, and has the potential to greatly improve the performance of the SRF cavity. The electrochemical and thermal synthesis (ETS) bronze route is one of the proven methods to achieve Nb₃Sn coating on copper. Its advantages are low cost, simple operation, suitable for complex cavity types and mass production. In this paper, we have prepared a copper-based Nb₃Sn sample specifically for Quadrupole Resonator (QPR) testing. We provide a complete set of QPR sample preparation processes from copper electropolishing, Nb sputtering, electrodeposition and heat treatment to synthesize Nb₃Sn. By optimizing the entire preparation process and key parameters, a new Cu-based Nb₃Sn QPR sample was successfully prepared, and its RF properties will be characterized by QPR testing system at HZB soon.

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Session Classification: Beyond Nb: Alternate materials and multilayer structures

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