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M2Po2C-06 [42]: RRR Measurements and Tensile Tests of High Purity Ingot Niobium

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High Purity large grain niobium ingots produced by CBMM, the global leading producer of niobium, have shown advantages in manufacturing superconducting radio frequency (SRF) cavities for particle accelerators in regard to less expensive fabrication and treatment procedures with comparable or better performance. For this application, the homogeneity of the ingot needs to be ensured. In this work, the homogeneity of the material was characterized through residual resistivity ratio (RRR) measurements and tensile tests. Test specimens are taken from the top, middle and bottom regions of seven niobium ingots produced by CBMM. RRR measurements are performed on the samples to ensure the high quality of the ingots. The measurements are performed with a GM cryocooler system and repeated 10 times for each sample. Tensile tests at room temperature are performed on samples from the same regions. Samples are machined according to ASTM standard test methods for tension testing of metallic material. Tests are performed with Instron tensile compression testing machine, and various mechanical properties such as Young's modulus, 0.2% proof stress and fracture strain are measured. Contents of impurity (N, O, C, H, Ta) of regions of the seven ingots are also investigated. These data also provide some insights in the possible correlation among RRR values, mechanical properties and impurity contents of niobium ingots.

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