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Study on the strength of large grain sliced niobium discs

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Large grain niobium has a higher production yield than fine grain niobium, the price can be lowered. On the other hand, it has a significant reduction in mechanical strength. In this study, tensile tests were conducted on different RRR (RRR185 and RRR495) of large grain sliced discs and two tensile speeds (5 mm/min, 2 mm/min) with more than 50 samples under each condition. In general quality control, three times the mean plus or minus the standard deviation is set as the control value. Using this method, the mean minus 3 standard deviations was reported as the minimum strength of large grain niobium. Since the mechanical strength of large grain niobium is highly dependent on crystal orientation, single crystal round bar tensile test samples were prepared and each crystal orientation was measured before tensile testing. We were able to show that there is a strong correlation between the crystal orientation and the yield stress of niobium single crystals. The purpose of this study is to present the minimum strength of large grain niobium and to provide information to cavity researchers.

Footnotes

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