

Progress in Ultra-Low-Radioactive titanium production

Friday, May 26, 2017 3:30 PM (20 minutes)

Basic principles of titanium production together with very high technological culture of titanium industry predefined a possibility to develop a technological cycle of the ultra-low-radioactive titanium (ULR-Ti) production. It was confirmed experimentally that it is possible to produce a titanium sponge with a level of contaminations below 1 mBq/kg of U and Th within an industrial Kroll-process. At the next step ULR-Ti sponge was converted into the construction titanium of VT-00 grade using EB-vacuum melting followed by bi-directional cold rolling and annealing to avoid a recontamination and keep the material as pure as the original sponge. The mechanical properties of the manufactured ULR-Ti fit demands for the VT-00 grade. Hence, this material could be used for production of cryostats, containment tanks, passive shielding and other mechanical elements of the modern low-background detectors. It was also tested and confirmed that a laser welding is preferable to an arc welding in order to keep ULR-Ti original purity. The mass of the first ULR-Ti bunch produced for test purposes and spent for radio-purity and mechanical tests at different production stages was of a scale of tens kilos. The jump from a laboratory kilos scale to the tons scale needs additional investigations. But it should be noted, that current kilos scale samples were manufactured by the standard industrial processes.

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Session Classification: Session 8