

Low Radioactivity Techniques (LRT2024)



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Surface cleaning techniques

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The traces of radioactivity present in the materials used to construct low background detectors can contribute to the dominant background signal for rare event search experiments. The surface contamination of detector materials is part of this significant source of background, primarily due to radon diffusion and plate-out of radon daughters. Exposure to environmental Rn during fabrication, assembly, and installation of the experiment can result in the accumulation of ^{210}Pb on surfaces. Due to its 22-year half-life, ^{210}Pb can act as a nearly constant source of radiation, along with its daughters ^{210}Bi and ^{210}Po , throughout the entire duration of an experiment.

The development of novel and effective protocols of cleaning, storing, transporting and manipulation of the detector components, is necessary to mitigate the native surface contamination of materials and prevent re-contaminations. The experience of LNL Surface Treatments Team during the years is here reported, focusing the attention on materials such as copper, stainless-steel, acrylic and Teflon, commonly used in low background experiments. The approaches, ranging from chemical and electrochemical methods to atmospheric and vacuum plasma techniques adopted for this purpose are here described.

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