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Thermal Neutron Detection Efficiency as a Function of Film Thickness for Front and Back Irradiation Detector Devices Coated with ^{10}B, ^{6}LiF, and Pure Li Thin Films

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Abstract : This paper discusses the physics of the detection of thermal neutrons using thin-film coated semiconductor detectors. The thermal neutron detection efficiency as a function of film thickness is calculated for the front and back irradiation detector devices coated with ^{10}B, ^{6}LiF, and pure Li thin films. The detection efficiency for back irradiation devices is 4.15% that is slightly higher than that for front irradiation detectors, 4.0% for ^{10}B films of thickness 2.4μm. The theoretically calculated thermal neutron detection efficiency using ^{10}B film thickness of 1.1 μm for the back irradiation device is 3.0367%, which has an offset of 0.0367% from the experimental value of 3.0%. The detection efficiency values are compared and proved consistent with the given calculations.

Keywords : detection efficiency, neutron detection, semiconductor detectors, thermal neutrons
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