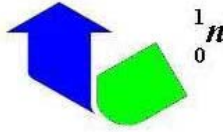


Landauer's Albedo Neutron (OSLN) Detector



Introduction

The InLight Basic - OSLN dosimeter responds to beta, photon, and neutron radiation fields and is used to measure whole body Hp(0.07), Hp(0.3), and Hp(10) resulting from beta, photon, and neutron radiation. The dosimeter contains three Al₂O₃:C detectors and one detector with Al₂O₃:C coated with ⁶Li₂CO₃. The dosimeter is composed of an N-type slide, LA-type case, and a polycarbonate holder. The dosimeter is capable of measuring beta with energies of 680 to 2284 keV E_{max} (227 to 761 keV E_{ave}), photons with energies between 16 to 1250 keV, and neutron energies from 40 to 5000 keV, **Table 1, Table 2, Figure 4.**

Slide Configuration & Detector Material

Landauer's OSL material (Al₂O₃:C) responds to both photons and beta radiations and is insensitive to neutron radiation. This material is located in read positions 1 (Element 1), read position 3 (Element 3), and read position 4 (Element 4).

For this Albedo dosimeter, Landauer has created OSLN material by coating the Al₂O₃:C with ⁶Li₂CO₃ to make the Al₂O₃:C sensitive to neutrons in addition to responding to photon and beta radiation. The OSLN detector is located in read position 2 (Element 2), **Figure 1** The neutron response is induced in the Al₂O₃:C when ⁶Li absorbs a neutron and produces both tritium and alpha particles, **Equation 1**. These particles have short ranges in the Al₂O₃:C and thus give up their energy in the Al₂O₃:C which generates a stored charge.



Equation 1 – Neutron Interaction with ⁶Li

Analysis

The InLight Basic – OSLN dosimeter, **Figure 2**, can be analyzed on InLight Manual, 200, 500, or microStar readers, **Figure 3**. No hardware modifications are required. A simple update to the reader software allows full analysis of the InLight Basic – OSLN dosimeter. Analysis can be done repeatedly to verify a radiation exposure or to accumulate a total dose over time. The typical depletion per read for OSL and OSLN material is less than 0.4% at full LED power (strong beam) and ~0.1% at weak LED power (weak beam).

Annealing and Re-use

The InLight Basic – OSLN dosimeter can be annealed to remove dose using Landauer's Model 50A Automatic Annealer.

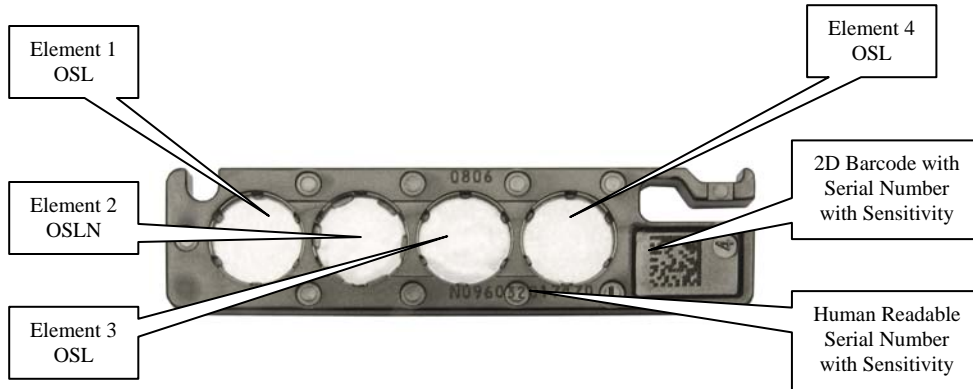


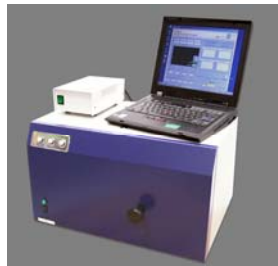
Figure 1: N-Type Slide



Figure 2
InLight Basic – OSLN Components



microStar



Manual



Automatic 200



Automatic 500

Figure 3 – InLight Readers

Table 1 – Energy Response

Field	Energy Response	
Beta	680 keV E_{max} (227 keV E_{ave})	2284 keV E_{max} (761 keV E_{ave})
Photons	16 keV	1250 keV
Neutrons	40 keV	5000 keV

Table 2 – OSLN Response/mrem Compared to Other Neutron Dosimeters

PNNL Neutron Field	OSLN Al ₂ O ₃ :C material coated with ⁶ Li ₂ CO ₃	LDR Neutrak CR-39	UD-802 ⁶ Li ₂ B ₄ O ₇	TLD-600 - TLD700 ⁶ LiF - ⁷ LiF
	Response/mrem	Response/mrem	Response/mrem	Response/mrem
Moderated ²⁵² Cf with D ₂ O Sphere	1.69	1.54	1.66	3.02
Bare ²⁵² Cf	0.22	1.54	0.21	0.31

Note: CR-39 correction factors are based on a reference calibration to AmBe.

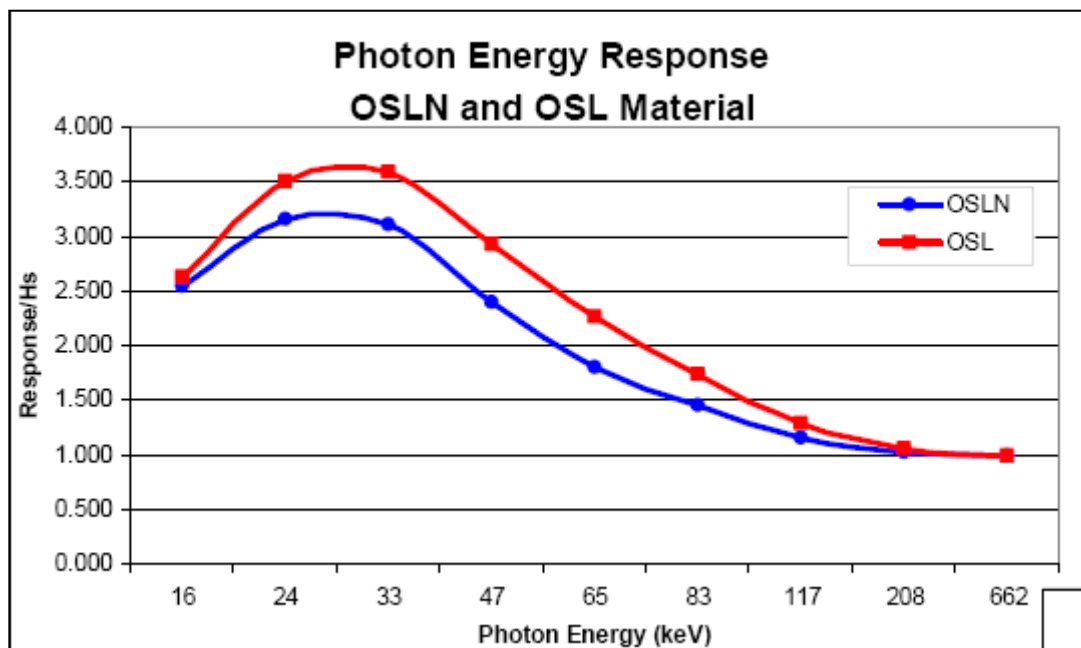


Figure 4 – Photon Energy Response