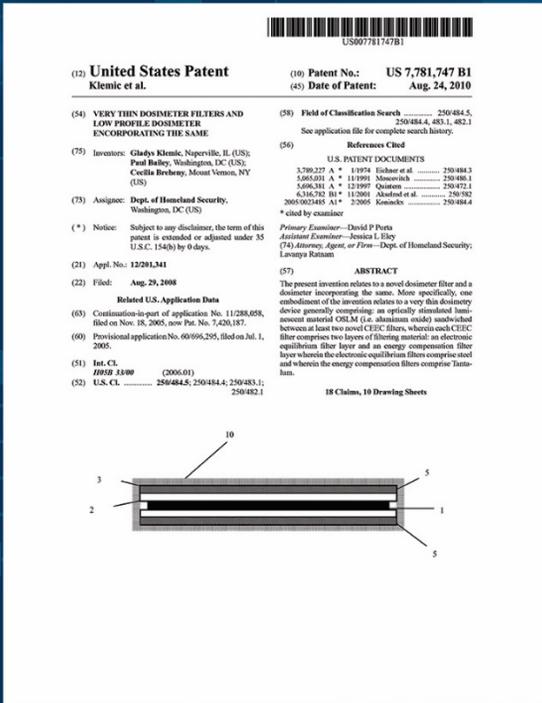


DHS' First Patent: The Low Profile Dosimeter



(12) United States Patent
Klemic et al.

(10) Patent No.: **US 7,781,747 B1**
(45) Date of Patent: **Aug. 24, 2010**

(54) **VERY THIN DOSIMETER FILTERS AND LOW PROFILE DOSIMETER INCORPORATING THE SAME**

(75) Inventors: Gladys Klemic, Newportville, IL (US); Paul Bailey, Washington, DC (US); Cecilia Murtagh, Mount Vernon, NY (US)

(73) Assignee: Dept. of Homeland Security, Washington, DC (US)

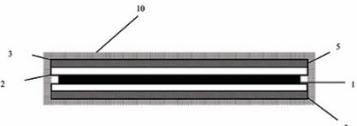
(*) Notice: Subject to any disclaimer, the terms of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 12/281,241
(22) Filed: Aug. 29, 2008

Related U.S. Application Data
(63) Continuation-in-part of application No. 11/288,658, filed on Nov. 18, 2005, now Pat. No. 7,203,197.
(69) Provisional application No. 60/096,295, filed on Jul. 1, 2005.

(51) Int. Cl. **A60B 3/00** (2006.01)
(52) U.S. Cl. **250/484.5; 250/484.4; 250/483.1; 250/482.1**

18 Claims, 10 Drawing Sheets



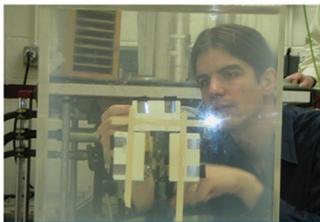
The Department of Homeland Security (DHS) Science and Technology Directorate's (S&T) National Urban Security Technology Laboratory (NUSTL) is responsible for DHS' first ever patent. The United States Patent and Trademark Office awarded NUSTL with patent # 7,781,747 for very thin filters in a low profile dosimeter on August 24, 2010.

The Low Profile Dosimeter, envisioned by NUSTL scientists Gladys Klemic, Cecilia Murtagh, and Paul Bailey, is a thin, portable device that would measure an individual's accumulated ionizing radiation dose in the event of a nuclear incident.

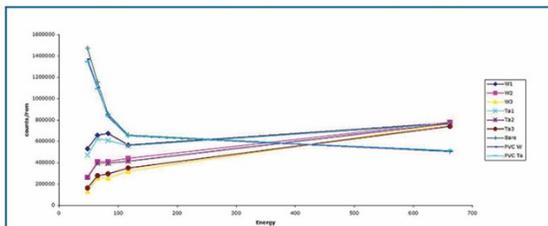
NUSTL began this effort by testing filter materials of varying thicknesses and combinations with a radiation sensitive material to determine how thin they could make the dosimeter while still achieving the targeted performance. After testing nearly a half a dozen materials, the NUSTL scientists determined that the metal tantalum allowed them to obtain accurate readings with minimal thickness. Combining tantalum with stainless steel in a unique double-layer filter achieved the correct response to a range of photon energies. It was this unique design that led to the patent award – **DHS' first patent.**



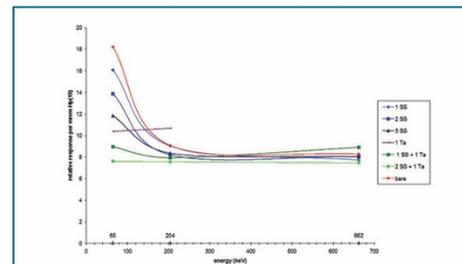
Adam Hutter, Director of NUSTL, presents Cecilia Murtagh (center) and Gladys Klemic with plaques commemorating the Department of Homeland Security's first patent, for the Low Profile Dosimeter.



NUSTL Chemist, Paul Bailey, preparing materials for irradiation.



Experimental results of tests of various filter materials to flatten the low energy over-response of aluminum oxide (Al₂O₃:C). The vertical axis shows the counts per rem personal dose equivalent at different photon energies for Al₂O₃:C behind different thicknesses of tungsten (W), tantalum (Ta), and polyvinyl chloride (PVC). The green line shows the response of Al₂O₃:C with no filters. This test showed that the metals reduced the low energy response but caused an undesirable increase at 662 keV.



Further testing found that a combination of stainless steel behind tantalum, shown here in green, mitigated the increase at 662 keV and provided the optimal filter combination for a flat response over a range of photon energies.

