

New Generation of Multi-Energy X-Ray Scanners for Anti-terrorist Inspection

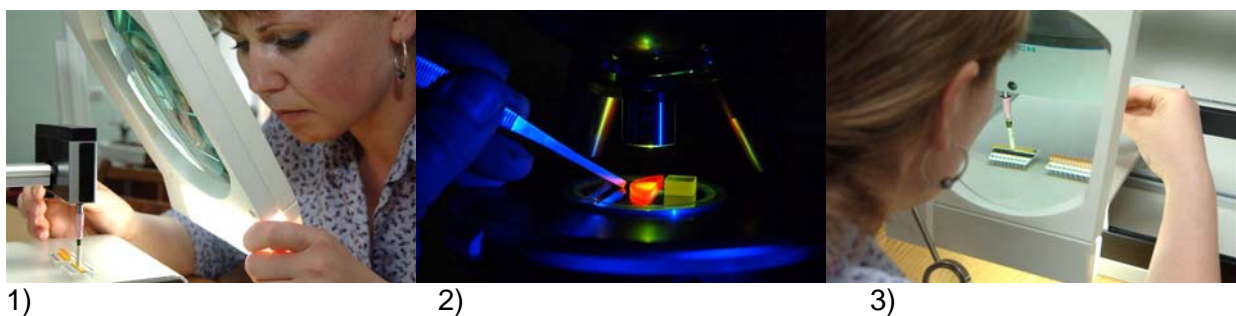
Science for Peace project 982823

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Since November 2007 scientists from France, Ukraine and the United States have cooperated to develop a new generation of multi-energy X-Ray scanners for anti-terrorist use to ensure the quantitative detection of explosives with a probability up to 90-95%. The target is envisaged to be solid and liquid explosives embedded in a background of inert organic materials with similar densities. Detecting such materials involves a new approach to visualization and recognition using X-rays in the dual- and multi-energy regimes.

This project will combine two technologies in one and the same instrument, i.e. that which uses multi-monochromatic filters for X-ray emitters and that which uses energy-selective scintillation crystals ZnSe(Te) and multi-energy detector arrays based on them. It is expected that a combination of these technologies, alongside the development of a new radiographic method for quantitative determination of the atomic and chemical composition of materials, will lead to substantial improvements in sensitivity to illegal and dangerous objects and materials.

Participation in the project of such organizations as DETEC-Europe, which is known for its developments in radiation-monitoring instruments, and Lawrence Livermore National Laboratory, a leader in homeland security developments in the USA, should guarantee integration of these joint developments into the security sphere of NATO countries.



Photos

- 1) X-ray detectors production: Precision assembly of 16-channel detectors of "scintillator-photodiode" type for digital radiographic systems.
- 2) ZnSe luminescence: Comparative luminescence of two scintillators based on zinc selenide placed on the object stage of an optical microscope. Red luminescence color - ZnSe(Te), yellow – ZnSe(Al,O). Both scintillators have been grown at STC "Institute for Single Crystals" (Kharkov, Ukraine).
- 3) X-ray detectors production: The assembly of low-energy (left) and high-energy (right) detectors "ZnSe(Te)-scintillator/16 pin-photodiode" under magnifying glass.