NOVA Scientific

INNOVATION IN NEUTRON DETECTION

ProxiVision

Neutron MCP Sensors for Detection and Imaging

Based on an exclusive worldwide strategic partnership
this unique Neutron Detector Concept is a common development of

NOVA Scientific, Inc., Sturbridge, MA, USA
and
ProxiVision GmbH, Bensheim, Germany.

NOVA Scientific is the sole inventor, originator and world leader in MCP-based neutron detection technologies for over 20 years, with a powerful intellectual property base.

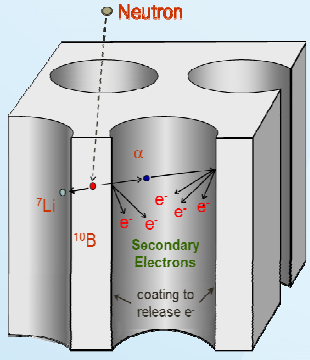
ProxiVision is a world leader in the development and production of high quality imaging detector technologies used for missile warning systems, industrial and scientific systems.

Drivers for Neutron Detectors

- He-3 gas tubes have been standard, but with rapidly dwindling supplies of the gas, where demand far outstrips supply both for neutron science and security. He-3 costs are volatile, increasingly expensive, with volumes highly restricted.
- New neutron facilities coming on line with very high flux neutron beams driving dynamic range and timing requirements for effective high resolution neutron imaging.
- Nuclear proliferation and terrorism on rise creating demand for more efficient solutions for monitoring of nuclear materials.

Neutron-Sensitive MCP Detectors

The neutron-sensitive MCPs are based upon the interaction of the neutrons with the ^{10}B isotope, yielding alpha and ^{7}Li energetic charged particles which are then internally amplified in ~8 micron microchannels to a large ~1 ns output charge pulse of electrons. For certain applications, Gd can also be employed.



Left: Operation of a ^{10}B MCP

- ^{10}B or Gd incorporated in either base glass melting or as a thin-film internal coating, or both. Patent-protected.
- Reactants create secondary electrons-reactant ranges matched to channel wall thickness
- Secondary electrons amplified up to large pulses as for night vision
- Efficiency proportional to B/Gd level

For more information visit
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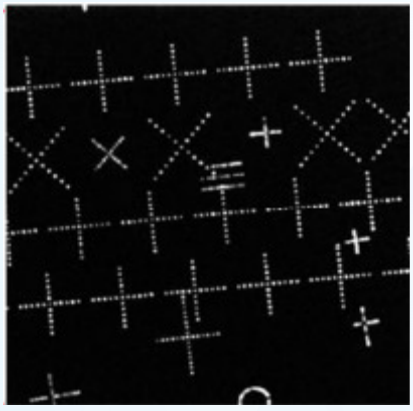
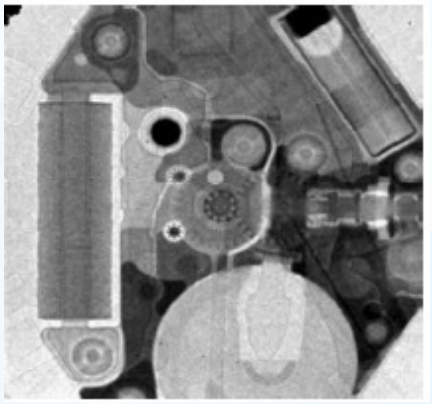
Neutron Radiography and Tomography

The specific method of using highly neutron-sensitive Microchannel Plates, boron-10 doped, inside a hermetically sealed vacuum tube, based on proven image intensifier design, is a novel approach for the detection and imaging of cold and thermal neutrons with unrivalled performance.

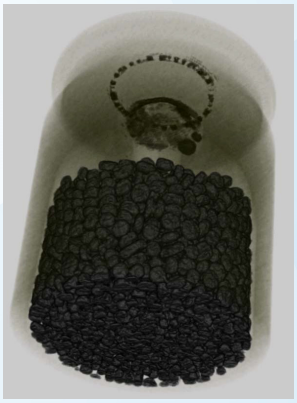
Below, images taken with NOVA's neutron sensitive microchannel plates coupled with a Medipix-2 digital readout (in conjunction with University of California Berkeley Space Science Laboratory, A. Tremsin et al.).



Neutron radiograph of a Gd mask with 50 µm pinholes using Medipix readout with thermal neutrons on NEUTRA beamline at Paul Scherrer Institute (PSI), Switzerland (CH), E. Lehmann et al.



Tomograph of a wristwatch on the ICON beamline at PSI (CH)



Cold neutron radiography and tomography of powder grains in a bullet performed at ICON beamline, PSI (CH)

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