



## New Silicon Detectors of Ionising and Optical Radiation Developed at ITE

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### CHROMATOGRAPHIC DETECTORS

In the years 2003 –2006, in co-operation with the **Institut für Radiochemie of the Technische Universität München** (IR TUM), three types of 64-element, linear arrays (64 x 1 cm<sup>2</sup>) for detection of  $\alpha$  particles were developed.

The particles, present in carrier gas (He) inside a hermetic case of array, constitute the products of reactions that are the subject matter of researches carried out by IR TUM. The carrier gas flows in a channel that is created by two 32-element arrays, which are 0,6 mm apart. During experiments, the arrays work at temperature gradient - the "cold" end of array is at the temperature of liquid nitrogen while the "warm" end of +30 C.

Epiplanar, p<sup>+</sup>-v-n<sup>+</sup> structures enable detection of particles of energy up to 12 MeV as well as protons and neutrons of energy up to 200 MeV.

Four types of detector structures as well as technology of array assembly were worked out. Four types of model arrays were made.



A fragment of array with structures pasted in



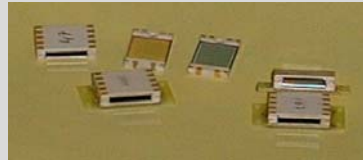
Making wire connections

In the year 2005 - within bilateral cooperation - a two-element (2x1 cm<sup>2</sup>), open detector for COLD (Cryo-On-Line-Detector) systems was developed at ITE for the **Paul Scherrer Institut (PSI) - Villingen, Szwajcaria**.

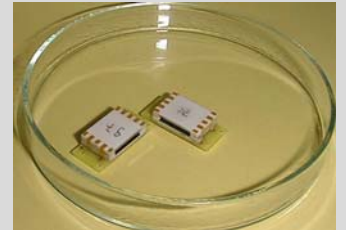
In this detector two detector structures - one covered with a thin (30nm) gold layer and the second without covering - face each other at the distance of 1.5 mm inside a ceramic case (sandwich set-up), enabling gas to flow between them.

Epiplanar, p<sup>+</sup>-v-n<sup>+</sup> structures enable the detection of  $\alpha$  particles of energy up to 14 MeV.

The two types of detector structure, ceramic case and the assembly technique were worked out.



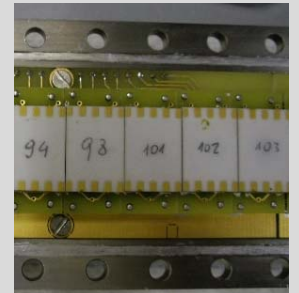
Detectors at different stages of the assembly



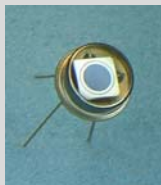
Finished detector "sandwiches"

The 50-element model set was made. At PSI, 32 "sandwiches" were mounted in the COLD unit.

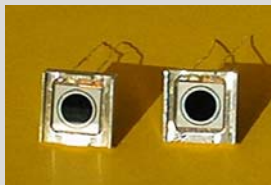
A fragment of COLD unit- set up at PSI using ITE detectors (fot. PSI)



### PHOTODETECTORS

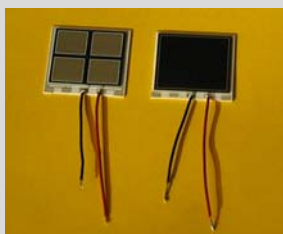


5 mm avalanche photodiodes in a standard case and in a case adapted for joining a scintillator



A new measuring photocell for oceanographic researches

### DETECTORS OF $\alpha$ PARTICLES



New specialised, dosimetric detectors for **Forschungszentrum für Umwelt und Gesundheit - Institut für Strahlenschutz (GSF) - Germany**

4x1.2 cm<sup>2</sup> and 6 cm<sup>2</sup>

**In May 2006, thanks to the ITE detectors applied in experiment carried out at Dubna (in Russia) for first time in history, the atoms of 112-283 element were registered.**

The experiment was conducted by the international team from PSI, Bern University and the Joint Institute of Nuclear Research. It was noted in many of German, Swiss and Russia reports as the significant achievement of the world science, including the Polish (ITE) one.



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