

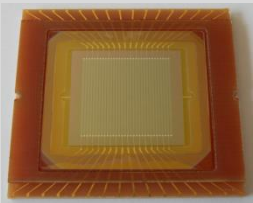


## Department of Silicon Microsystem and Nanostructure Technology

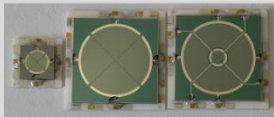
### The Department

- Has a unique experience in design and manufacturing of highly specialised silicon detectors. Available are different type diodes p-i-n and avalanche. Institute owns the silicon fab line and assembling capacity. Designs are conducted in collaboration with customer. The technology enables the construction of both discrete detectors and multi-junction monolithic detector arrays (single-sided strip detectors in case of the epiplanar structures, and single- and double-sided ones in the case of planar structures). Many problems had to be overcome in order to develop the detectors, as, in contrast to the majority of other semiconductor devices, they have a very large p-n junction area and a usually very thick electrically active area.

### Sample developments



**Positron sensitive photodiodes and photodiode matrix** many different layouts of this type of device were designed manufactured in close cooperation with the customers, providing 'tailor made' elements. With optimised to application sensitivity and a very low leakage currents nanoamperes per square centimeter.



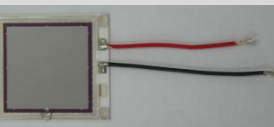
**High sensitivity infrared photodiodes** family of silicon photodiodes optimised for  $1,064 \mu\text{m}$  was developed, sensitivity  $S > 40 \text{ A/V}$  for  $V_r = 45 \text{ V}$  was achieved.



**Avalanche photodiodes** the technology for the family devices with active area varying from 0,3 to 3 mm was developed. Such elements were used for range meters which were in mass production.



**Detectors for neutron dosimeter** were designed and are produced for neutron dosimeter design for monitoring the level of neutron radiation in nuclear power plants and nuclear stockpiles. Design was developed in cooperation with the Institute für Strahlenschutz, Helmholtz Centrum, München, GmbH, Germany (HZM). This real-time dosimeter, unique in the world, registers neutrons in a broad energy range (from 0,025eV to 20 MeV).



**Detectors for radon dosimeter** were designed and developed in cooperation with HZM. The detectors have sensitivity of 1 count/h with a concentration of radon  $^{222}\text{Rn}$  in the air of  $30 \text{ Bq/m}^3$ . The radon exposimeter is currently implemented into production.



**Detectors for transactinide studies** whole family of detectors was designed in cooperation with Institute für Radiochemie Technische Universität München (IR TUN) for international studies of transactinides carried out mainly at GSI Helmholtz für Schwerionenforschung GmbH (GSI-Darmstadt). Manufactured at ITE detectors led to discovery of three new nuclides and helped to determine the properties of element 112 (Cn) as well as confirmation of existence of element 117 (Tennessine).