50 mm² Silicon Drift Detector in compact TO8 housing

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Silicon Drift Detectors (SDDs) are the state of the art X-ray detectors and are used in many applications like XRF, TXRF, electron microprobe analysis systems and synchrotron applications.

As the spectroscopic performance of SDDs is principally independent of the active detector area there has been a growing demand for increased detector areas. Commercially available are SDDs with areas up to 100 mm².

We will present a SDD with an active area of 50 mm² integrated in a very compact TO8-housing. The outer diameter of the housing is only 14 mm. The TO8-housing is the standard housing for SDDs with areas from 5 mm² to 30 mm². Also the pin-layout is the same as for standard SDDs. Integrating a 50 mm² in the same housing offers the capability to easy replace detectors in existing instruments by the new large area SDD.

The housing is completely evacuated to allow for an effective Peltier cooling of the detector. The integrated Peltier enables chip temperatures down to -60°C at an ambient of +20°C with very low consumption. These operating temperatures lead to excellent spectroscopic performance. The FWHM of the Mn-Kα line is typically 127 eV, peak to back ground values of more than 10,000 are achieved.

Temperature dependent measurement of the energy resolution will be presented as well as the shaping time dependency. By choosing optimum chip temperatures and shaping times the detector can be operated also at high ambient temperatures up to +50°C still showing very good spectroscopic performance.

The count rate dependency of energy resolution and peak position will shown to be negligible up to very high count rates.