

# Charge carrier transport in THM grown CdTe

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## Abstract

Cadmium telluride (CdTe) has long been regarded as a good material for the use as a solid state ionising chamber. Since the advent of well controlled liquid phase growing processes, such as the traveling heater method (THM), single crystal CdTe has been available. To improve detection processes further one must understand the parameters effecting charge transport, especially the role of crystal defects (such as the prevalent tellurium inclusion) in deviating the behavior from the 'ideal' crystal.

This work focuses on induced charge and current pulses studied as a function of temperature and with spatial resolution in single crystal CdTe grown by EURORAD. The electron and hole  $\mu\tau$  product is individually derived for each piece of material as is the electron and hole mobility. These values are all within the range of accepted values for good quality spectroscopic grade material given in the literature.

To complement the electrical characterisation several non destructive optical methods are carried out. These include Lang X-ray topography and infrared microscopy, both of which allow the structural quality of the material to be assessed. From these measurements it is clear that we are in possession of several samples with a high density of tellurium inclusions. The effect of these defects on charge transport is observed using time resolved ion beam induced charge (IBIC) imaging.

Temperature dependent mobility is investigated and results are compared to a model of scattering mechanism in CdTe. Voltage dependent trapping/detrapping is also observed leading to the conclusion that a multiple trapping/emission process is taking place and finally electric field profiling is undertaken and the results compared to other techniques given in the literature.