

Terahertz radiation has a large number of applications in imaging and sensing as well as in other fields. TeraNova is realising two pre-production Demonstrators that utilise many of the technical and scientific advances developed in other parts of the programme over the last three years.

Semiconductor Wafer Scanner

- ❖ THz radiation is ideally suited for probing the important properties of semiconductor wafers, in particular multi-layers grown by molecular beam epitaxy (MBE). Our development will enable the mobility and carrier concentration of a wafer to be mapped non-destructively. The second phase of the development will ensure that information on specific layers is also revealed. It is envisaged that this equipment will speed up MBE growth, since wafers do not have to be destroyed for off-line analysis.

The scanner uses broadband THz pulses that interrogate an MBE-grown wafer. Fibre delivery systems are used as shown. The whole unit (right) is compact and can be used in a semiconductor production unit.

Micro-integrated Single-cell THz Spectroscopic Sensor (MIST) for Sex Selection.

- ❖ TeraNova is developing a Demonstrator that will sense single cells in a label-free fashion. In this system, living cells will be transported in a microfluidic environment. The final sensitivity of the Demonstrator should be sufficient to distinguish X or Y chromosomes and hence provide an automated system for sex-selection for use in livestock and bloodstock production.

The left hand picture shows the first phase of instrumentation for the MIST system. The equipment produces THz images (right) of spermatozoa. These are shown in blue; the head and tail are just visible.

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