



Young Company Finance - April 2004

Real time gas sensing from Cascade Technologies

Cascade Technologies, a start up based on technology developed at the University of Strathclyde, is developing gas sensing instrumentation with unprecedented levels of performance.

The technology, claimed to be the world's first real time gas sensing system, will be able to detect drugs, explosives, and hazardous compounds far more effectively than any other system currently available.

The company has completed a funding round comprising £600k equity from the Synergy Fund (£150k), the Business Growth Fund (£100k), and individuals (£350k), plus an RSA award of £180k and a SPUR grant of £150k. Bank of Scotland provided a SFLGS loan of £50k, and the £1 million mark was reached with the recognition of a further £100k "sweat equity".

The system being developed by Cascade is based upon quantum cascade (QC) lasers, invented by scientists at Bell Laboratories in 1994. The QC laser is a semiconductor laser which in essence operates like an electronic waterfall; electrons cascade down a series of identical energy steps built into the material during crystal growth, emitting a photon at each step. This is unlike diode lasers which emit only one photon over the similar cycle. In practice this means that QC lasers can outperform diode lasers operating at the same wavelength by factors greater than 1,000 in terms of power due to the cascading effect and the ability to carry large currents. The other revolutionary aspect of the QC laser is that it can be designed to emit at any wavelength over an extremely wide range using the same combination of materials in the active region.

The potential application to gas sensing was recognized by Bell from the outset, and a number of organisations have used the technology in this way. Cascade's own particular development of the technology, the outcome of research at the University of Strathclyde, is claimed to have a number of considerable advantages protected by patent applications:

it gives 'fringe free' operation and high resolution, which translates as ultra high sensitivity for target gases, equivalent to one molecule per trillion in a sample;

it can identify compounds, and measure multiple gases simultaneously;

it has extremely high measurement rates, up to a million times per second; and

it can operate at room temperature.

The system requires no consumables, and is ideally suited to the development of mobile devices for a range of markets. The security, military and commercial markets for this technology are currently over £7 billion in value and increasing constantly. The point of care medical diagnostics sector is another significant market for Cascade and adds a further £21 billion of commercial opportunity for the business.

A prototype gas sensor has already been completed (owned by the University) for proof of concept. Cascade expects to have a prototype packaged laser ready in six months, with a beta prototype of the full system within a year. The company is working with some major potential partners in different prospective markets, which will allow rapid market access once commercial products are available.

Cascade Technologies was started in January 2003 with £26k initial financial support from UpStarts, the business investment vehicle set up by the Strathclyde University Incubator (SUI) to support start-up companies. Additional funding came from the founders, from Scottish enterprise/SE Glasgow, and from the chairman and business development director. The founding management team was Erwan Normand (the inventor), Richard Cooper (a manufacturing engineer by profession), and Iain Howieson (an optics specialist), who were joined this year by David Frew (formerly managing director of Crowcon Detection, one of the UK's largest gas sensing companies) as business development director. Jim Cooper, who led the sale of First Engineering to Porterhouse and EJ Stiell Group to McAlpine, was appointed chairman to the company in November, following several months working with Cascade as an adviser.

Cascade Technologies is the 17th investment by the Synergy Fund since it was launched in 2000 by the universities of Glasgow and Strathclyde, as a University Challenge Fund financed by the DTI's Office of Science and Technology. The Fund is managed by Scottish Equity Partners, which also manages a University Challenge Fund, NEStech, for the universities of Dundee, Aberdeen and St Andrews.