

Prudent partnerships

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Joe Habib says he learnt how to run a technology company by working for a business that was profligate with cash. "Truck loads of new equipment used to turn up every day. We were spending money as though there was no tomorrow," Mr Habib says of his four-year spell at Nanosciences, a Connecticut-based start-up that went out of business in the early 2000s after attracting about \$10m (€7.2m, £6.7m) of investment funding.

Mr Habib now follows a more cautious approach. At Illuminex, a nine-person company that he started in 2003, he has steered away from trying to attract large amounts of early-stage funding. Instead, Mr Habib has slowly built up credibility by partnering with bigger companies, raising cash by selling samples of his products and making use of small government grants.

Only in the past two months, as he feels he is making headway with his ideas to develop new types of materials based on ultra-thin strands of metal, has Mr Habib been approaching venture capitalists about trying to raise serious amounts of money – perhaps as much as \$3m – to support his plans.

It is a stance that is in keeping with today's tough economic times. With banks and other financial groups desperate to conserve cash, investment groups are wary of putting large sums into businesses that have bright ideas but no proven products.



"It has become very important for new companies to demonstrate that they have a clear route to viable products, and linking with bigger companies can provide a way to do this," says Alan Brown, director of the Pittsburgh-based Pennsylvania Nanomaterial Commercialisation Centre. Backed by large companies such as US Steel and Alcoa, the centre promotes ties between big and small companies in efforts to develop nanotechnology.

For Mr Habib, it has been an exercise in how to survive with minimal money. The 48-year-old entrepreneur is a late starter to science and engineering. He finished a seven-year physics doctorate at Massachusetts Institute of Technology at the age of 38, after spells as a car mechanic and running a music publishing business.

Initially, he ran Illuminex from premises in Lancaster, Pennsylvania, that were rented from a local university for \$150 a month. From the start, the company relied on research grants, normally amounting to a few hundred thousand dollars, from organisations such as the

National Science Foundation, supplemented by contracts with companies such as Raytheon (*see right*).

In 2005 Mr Habib bought out his co-founder, paying \$30,000 for his stake of roughly 50 per cent. He now owns about 96 per cent of the business.

The following year, Illuminex moved to a bigger location: laboratories and offices in a disused industrial research campus near the town centre. Mr Habib's modest office contains a mass of impressive-looking analytical machines bought from the former tenants. "I got all [the equipment] for \$100,000, a 10th of the price it would have been if new."

Other companies are following a similar approach of cutting costs while nurturing key relationships. Y-Carbon is another Philadelphia-based start-up, founded in 2004 by Yury Gogotsi, a Ukrainian-born scientist who is a professor at Drexel University in Philadelphia. Prof Gogotsi, Y-Carbon's chief scientific officer and main shareholder, wants to develop an array of materials based around novel types of carbon, and has mainly used government research grants and small amounts of money from Pennsylvania state agencies to give his business a start. Funding to date has come to a paltry \$600,000.

Joint initiatives designed to help Illuminex take the heat off

Joe Habib, founder of Illuminex, has formed two key partnerships with larger companies to try to develop his business.

In both cases, Illuminex, which is likely to have revenues of about \$850,000 (€609,500, £573,400) this year, is supplying extremely

However, Y-Carbon also has a link with BAE Systems, which is funding its work on two fronts. The UK military equipment company is interested in special types of highly porous carbon that could be used for filtering out chemicals from gases or liquids as a potential means of protecting against chemical warfare agents. BAE is also interested in using Y-Carbon's materials as the basis for new "supercapacitors" that could replace batteries in equipment such as space satellites and battlefield radios.

Y-Carbon, which expects revenues next year of about \$1m, also has a connection with Arkema, a US speciality chemicals business, which is letting the company use some of its laboratory space close to Philadelphia for a low rent and giving Prof Gogotsi and his six fellow employees access to some of its technical expertise. "I feel it's important not to try to bring in outside shareholders too early," says Prof Gogotsi.

Nanoscape, a Munich-based producer of zeolites – molecules with applications in fields such as catalysis, water filtration and energy transfer – has adopted much the same stance. The company, set up in 2001 to exploit work in advanced materials by researchers at Munich's Ludwig-Maximilians- University, has so far survived on equity investments totalling less than €1m. With 13 employees, it has built sales up to about €1m (\$1.4m, £950,000) this year through supplying materials and know-how to several bigger businesses. One of these is Klingenburg, an industrial equipment maker based near Essen, northern Germany, that uses Nanoscape's zeolites as special coatings for rotors.

Even start-ups that have received hefty amounts of finance in the past say that in today's environment developing slowly is probably the best option. Cambridge Broadband is an eight-year-old UK company that this year expects revenues of about \$27m on the back of \$70m of investments from venture groups including Amadeus, the UK-based early-stage investment business.

The company supplies microwave networks for mobile phone operators in Africa, the Middle East and eastern Asia, and has just raised another \$5m from its investors. Graham Peel, chief executive, says that raising new finance would have been much tougher if his business had been new.

"With the state of the world economy, it is harder to believe that venture groups will be ready to finance years of losses in a start-up company," he says. "If the company has products that are virtually ready for the market, and can point to customers that have a positive view of them, then they will stand a better chance."

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thin strands of metal wires for heat-transfer applications. The wires have something approaching the structure of a "shag-pile" carpet but on a microscopic scale. Because they present a very large surface area packed into a small horizontal space, they make an efficient heat-transfer mechanism.

Illuminex is being paid just over \$300,000 by the defence equipment group Raytheon, which thinks the structures could be useful in ducting away heat in equipment such as radars.

It also has a link with Thermacore, a US leader in "heat pipes" for transferring energy away from equipment such as personal computers or medical devices.

Jerry Toth, chief executive of Thermacore, says experiments with heat pipes made using Illuminex's wires have been "highly promising" in speeding up the flow of heat energy beyond what is possible with normal materials.