

## **INSIDE TRACK: Thinking big in nanoscience**

By Peter Marsh  
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Stefan Reineck has a dual identity. While his main job is as chief executive of an established high-technology company in Germany selling to the electronics and semiconductor industries, he also acts as a "god- father" investor to a group of fledgling technology businesses based in Germany and the US.

As a result Mr Reineck, who has a background in the worlds of both industry and venture capital, has an impressive platform from which to monitor the growing trend among big and small companies in new technology to view each other as potential partners.

Since last September Mr Reineck, a physicist, has been in charge of Steag HamaTech, a leading maker of specialised machines for coating thin layers of materials on to other substances. The process is used in producing optical storage discs (for use as computer memory or compact discs) and in integrated circuit manufacture. Previously, Mr Reineck has been involved in a range of venture capital activities, having worked in the 1980s at the Leybold vacuum pump group in Germany.

At Steag, based near Stuttgart, he has a tough challenge. The group, with estimated sales in 2002 of about  $\square$ 120m (£80m), slid into a big loss in 2001 on the back of the global downturn in the computer and electronics industries and is only slowly pulling itself round. Even so, Mr Reineck believes he has enough free time to continue stewarding four small high-technology companies in which he is a minority investor and helps out as a non-executive board member.

These companies operate in four distinct areas - new chemical materials, microchip manufacture, high-tech motors and lasers - giving Mr Reineck a view of a broad technological field. "I don't want to play a big part in [the four companies'] management. I want to be a combination of spectator and actor, helping out where it is appropriate."

In these efforts Mr Reineck will try to provide useful management ideas, linked to his previous experience, while advising on which companies the four should link up with globally and the best ways to do this. All four plan to use "networking" with other companies - mainly bigger ones - to further their evolution, a strategy important to other small businesses, including many in the high-tech cluster in Cambridge.

One of the four companies that could ultimately make a sizeable impact on the wider corporate world is Munich-based NanoScape. It is using ideas in nanotechnology (the science of new materials made to tiny dimensions) to devise a range of catalysts that speed up processes in industries such as heavy chemicals manufacturing.

Established just over a year ago by a group of researchers, NanoScape is selling small amounts of new chemicals to established companies in the industry, such as Engelhard of the US and Germany's Wacker, two big makers of catalysts and silicon materials respectively. It is also in touch with large makers of catalysts and speciality materials, including UOP and CRI Catalyst of the US and Süd-Chemie of Germany, about how it could use its ideas to devise new products that the larger groups could license.

Mr Reineck says NanoScape has a "very competent and ambitious team" that he expects to do well in pushing its technology into the broader corporate world, possibly with the help of ideas that he could supply. One specific technology in which Mr Reineck has expertise - dating from his time at Leybold - is a process known as chemical vapour deposition. It is highly important in Steag's machinery and relevant in the possible production methods for NanoScape's catalysts.

Wayne Daniell, chief executive of NanoScape, says the company is talking not just to existing makers of catalysts but also to bulk chemical producers such as BASF, Dow and Royal Dutch/Shell that currently use the materials to produce staple chemicals including styrene.

NanoScape is working towards building a small pilot plant to turn out its new catalysts, which could greatly speed up the manufacture of styrene and possibly make it less expensive. The Munich company's materials are based on "nano-zeolites": substances containing tiny carbon tubular-shaped structures with dimensions measured in nanometres (billionths of a metre).

Typically, the dimensions of the structures in existing catalysts are 100 to 1,000 times greater. Because of the novel materials' extremely fine structure, they present a greater surface area to reacting chemicals, improving the speed of the process, which explains their potential use in catalysis.

Mr Daniell says a big challenge will be to cut the production cost of his company's current generation of catalysts - now about \$3,000 (£1,900) per kilogram - by a factor of 100 or more to make this comparable to the cost of making existing generations of catalysts.

Another Munich company in which Mr Reineck has a stake - and a part-time role in its development - is Attocube, a maker of tiny motors based on piezo-electric ceramic crystals. These could be used as novel positioning devices in industries such as printing and scanning electron microscopy.

In a further potential application, they could replace conventional bearing-based motors, working at very low temperatures such as those experienced by satellites. At these temperatures, the lubricants in traditional motors would freeze, rendering the devices useless. Attocube's long-term progress will depend at least partly on its ability to form links with larger machinery and engineering groups: an area where Mr Reineck's connections in the industrial processing world could prove useful.

The two remaining businesses in his personal network of technology companies are Crystal, a Berlin laser maker, and WaferMasters of San Jose, California, which is developing specialist thermal furnaces and related processing machines for the semiconductor business.

Set up three years ago, Wafer-Masters faces two challenges: tough competition from big groups in semiconductor production machines such as Applied Material of the US and ASM Lithography of the Netherlands; and a weak market following a big slump in semiconductor production. Nonetheless, it has built up its sales to about \$10m a year.

According to Taro Yamazaki, WaferMasters' chief executive and co-founder, Mr Reineck's contacts in the microchip industry have been instrumental in helping the group form links with European microchip producers such as Philips and Infineon. "Stefan's played a big contribution to growing the company," says Mr Yamazaki. "He understands what's important [in company strategy] and has pointed us in the right direction." Both men are hoping the company will continue to expand, making use of Mr Reineck's contacts and ideas whenever applicable.