

How Germany nurtures its nanotech industry

The country supports innovators in interesting ways.

BY ANDREAS VON BUBNOFF

Although the United States leads the global nanotech landscape, Germany is not far behind. That is the conclusion of a new Lux Research report that compares the nanotech landscape in 14 countries.

The report found Germany among the top three in most categories. For instance, Germany is second behind the U.S. in the number of academic nanotech research centers, third behind the U.S. and Japan in both corporate R&D spending and public funding, and second behind the U.S. in the number of patents issued.

What conditions have helped Germany to achieve this status? How do the academic, government, research, and commercial constituents work together? How is Germany nurturing the growth of nanotech—an industry it sees as a second opportunity to do things right? This article helps answer these questions and more.

Start-ups augment stalwarts

“The climate for nanotech in Germany is very strong,” says Michael Holman, a senior analyst at Lux, and the report’s lead author. “The combination of a pretty vibrant start-up community and leading [traditional] companies like BASF and Degussa that are very active in the field has put Germany in a very strong position.”

Large German companies are indeed a big factor, with BASF alone planning to invest 180 million euros in nanotech R&D between 2006 and 2008.

The country’s vibrant start-up environment is revealed in a German government-commissioned report conducted last year by the VDI technology center in Düsseldorf. The report estimates that Germany has about 200 nanotech start-up companies founded in 1995 or later

(see www.nano-map.de for a list). The start-ups alone have created about 5,000 new jobs, representing one-tenth of the total of about 50,000 German nanotech jobs, says Gerd Bachmann, a co-author of the VDI report. What’s more, seven young companies got listed on the German stock exchange in just the past two years.

Still, the number of new start-ups per year has been decreasing between 2000 and 2005, says Wolfgang Luther of the VDI and one of the report’s authors. The decline, he says, could be due to the skepticism of investors in the years after the dot-com crash in the U.S.

Furthermore, it is more difficult to get venture capital to invest in nanotechnology in Europe and Germany than in other countries like the U.S. A report by the U.K.-based consulting firm Cientifica concluded that U.S. venture capital investment in nanotech in 2005 was six times that of Europe—despite a similar-sized market with similar amounts of nanotech funding. The recent Lux report found that in 2006, just \$36 million in venture capital was invested in Europe, compared to \$550 million in the U.S. “I think it’s fair to say that there is more of an entrepreneurial culture in the U.S. than in Europe,” Holman says.

Katja Lindenlaub, a financial analyst at German investment firm Nanostart, agrees. “It’s hard to translate research results into companies and products,”

she says, “in part because of the risk aversion of investors in the past several years.” Nanostart is one of only a few German investment firms that were willing to invest money into nanotech in the past few years, she adds. Nanostart, founded in 2003, has been listed on the German stock exchange since 2005. It invested in ITN Nanovation and Nanofocus, two of seven German nanotech companies currently listed on the German stock exchange.

New initiatives and VC alternatives

To improve the venture capital and investment situation, the German stock exchange, Nanostart, and others have organized NanoEquity, a conference that brings together investors, nanotech companies, and scientists. The third-annual NanoEquity (www.nanoequity.eu) will take place June 11-12 in Frankfurt, says Alexander von Preysing of the Deutsche Borse Group, which runs the Frankfurt Stock Exchange.



Perhaps a lack of venture capital is part of the reason there are fewer nanotech start-ups in Germany than in the U.S., where the number is probably well over 1,000, according to Charlie Harris, chairman and CEO of the U.S.-based nanotech investment firm Harris and Harris.

But not everyone agrees that the number of start-up companies is a good indicator of the state of German nanotech. “That’s a bit misleading,” says Cientifica CEO Tim Harper, adding that large

traditional chemical companies like BASF probably sell more nanomaterials per year than all the nanotechnology-based start-up companies combined. And with plenty of public funding, the lack of venture capital in Germany is not as serious as one might think. "Money is money," he says. "You don't care whether the funding comes from the government or VC."

Raising money by selling stock has actually gotten easier for young German companies than for their U.S. counterparts. In Q4 2005, the Frankfurt Stock Exchange introduced the so-called entry standard, a lower reporting and accounting standard than the one used in the U.S. The standard, which among other things doesn't require the issuance of quarterly reports, could save companies a lot of money, claims von Preysing. Lux's Holman notes that in the U.S., some small

For example, the original business plan for Nanogate was created based on ideas from the INM, says Zastrau. The operational start of Nanogate was in 1999, with venture capital funding. Today, 53 people work at the company, which has been profitable since 2004 and went public last year.

Harper says one challenge for start-ups is to move up the value chain by selling products rather than just bulk nanomaterials that other companies incorporate to add value to their products. He compares this to selling cement or bulk chemicals, which are not very profitable except for big companies like Degussa that can sell massive amounts. To succeed, start-ups must be more application-focused, says Harper.

That is exactly what Nanogate is doing, says Ralf Klenke of Nanogate Advanced Materials, a subsidiary of Nanogate. He says a customer who wants to put a

to spend," he says, adding that he doesn't want the company to get listed on the stock exchange anytime soon. "We don't want to sell. It's better when the profits go into your own pocket."

Not all German start-up companies are profitable, of course. Aquanova AG, for example, was founded in 1995 and produces nanoencapsulated dietary supplements such as co-enzyme Q10 to increase their bioavailability. One reason Aquanova is not yet profitable is that clinical trials are time-consuming, says Frank Behnam, who is responsible for corporate development at Aquanova. He says the company will likely be profitable in 2008 or 2009.

Nanomaterials, followed by . . .

Given the long tradition of its chemical and pharmaceutical industry, Germany's strength is in nanomaterials; big players like BASF or Degussa hold strong positions. "German companies have been selling chemicals and materials around the world for 70, 80 years," says Cientifica's Harper. "They are very well-connected. It's very easy [for them] to just add another line to the catalog."

But there are other fields to watch, like healthcare, Holman says, with companies such as C invention AG, which makes nanostructured carbon coatings for medical devices, and MagForce, which injects magnetic nanoparticles that concentrate in tumor areas. A magnetic field can then be used to heat them to destroy tumors without using chemotherapy or surgery. Both companies' products are still in clinical trials, but they're promising, says Holman.

However, certain traditional fields, like the German textile and construction industries, still need to understand the advantages of going nano, says Bachmann. A new German government initiative called "Aktionsplan 2010" wants to speed up innovation in these areas, he adds.

Perhaps with all these activities, Germany won't repeat the same mistake with nanotech as it made with computers in the past. "We have invented the computer," says Aquanova's Behnam, "but we haven't been able to translate that into products like the Americans did." ■

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firms spend as much as \$1 million just to comply with the reporting and accounting regulations to get listed. In Germany, that is no longer the case.

Indeed, saving money was one of the reasons why his company decided to get listed under the new entry standard last year, says Nanogate CEO Ralf Zastrau. Five young nanotech companies have become listed under the new standard since it took effect, von Preysing adds.

Leveraging university "capital"

Another strength of Germany is its many universities and research centers that help spin off nanotech start-ups, says Cientifica's Harper. In fact about two-thirds of German start-ups come from such spin-offs, according to the 2006 VDI report. "When people say Germany is not entrepreneurial, I point to places like Saarbrücken," Harper says, referring to the Institute of New Materials in Saarbrücken, which has generated a number of spin-offs.

nanoparticle-based coating on, say, a bathroom sink, doesn't get a lot from just buying nanoparticles. "We deliver everything," he says, including instructions and sometimes even the equipment to apply nanotech-based coatings that give surfaces certain useful properties.

Another profitable company that spun off from academia is microscope manufacturer WITec. The company was founded 10 years ago by three Ulm University physics postdocs. It produces ready-to-use, customized microscopes, such as scanning probe microscopes, used to analyze nanostructures. Initially, Ulm University let the company rent lab space, says co-founder Klaus Weishaupt. "Ulm is a very good place for high-tech start-ups," he explains.

Unlike Nanogate, WITec was funded with private money, which is not necessarily a bad thing, Weishaupt says, because it creates pressure to make profits as soon as possible. "If the fridge is empty, the pressure is greater to make money than when you have millions from an investor