out of the way, whereas the same air encountered by a small insect is like swimming through honey," explains Robert Michelson, an engineer who runs the consultancy firm Millennial Vision, in Canton, Georgia.

To improve their designs, drone manufacturers have been taking advantage of new technologies. For example, ever smaller and lighter cameras can be incorporated into the craft to beam real-time images back to the ground. Sensors to measure radioactivity or other environmental conditions can also be incorporated cheaply if required.

Drones have also become much easier to fly: better gyroscopes and control software help to stabilize them during flight, and the global positioning system simplifies remote navigation.

Four-rotor, remote-control helicopters made by Microdrones of Kreuztal, Germany, for example, use three gyroscopes and three accelerometers each for stabilization. Their MD4-200 craft weighs less than a kilogram and can fly for 20 minutes between charges.

Microdrones was set up in 2005 by four men who liked to fly remote-control hobby aircraft. The company now has 12 employees and has sold more than 100 of its helicopters for about €10,000 each ($13,000).

Virtual reality

Thorsten Kanand, one of Microdrone's founders, says that the MD4-200 is much simpler to fly than drones modelled on traditional, single-rotor helicopters. The person handling the remote control can even wear goggles to see live images relayed from the vehicle hovering overhead. "This is the sort of gadget we saw in science fiction shows on TV just a few years ago," he says. "But it is reality now."

Kanand notes that many buyers are as enticed by the fun of playing with the drones as by their practical value. "It's not always the businessman I am selling to," he says. "It is often the small boy in the businessman."

Drones have already established a modest foothold in some areas. In Japan, for instance, Yamaha Motor sells up to 300 of its RMAX unmanned helicopters every year for crop-spraying on private land.

But enthusiasts foresee a bolder future. Michelson, for example, predicts that major improvements in propulsion and autonomy will create "thinking machines" of "sizes down to a few centimetres, with the endurance of a flying insect." And where Michelson sees small, Davidson thinks big. "When the commercial segment really takes off, you'll see unmanned aircraft begin to take on almost any traditional role that is done by a piloted aircraft," he says. ■

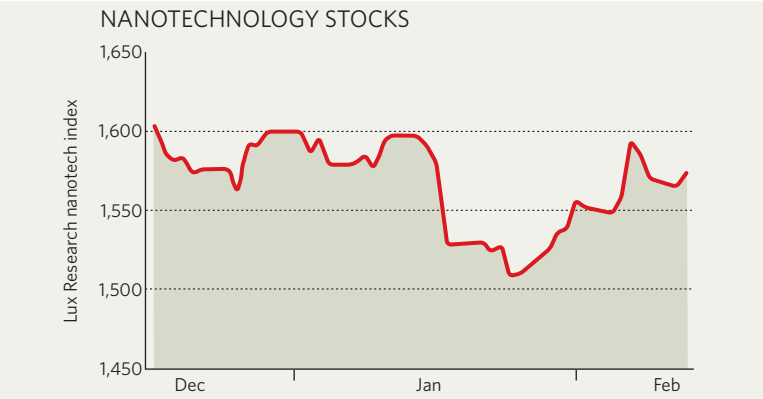
IN BRIEF

CLEAN FUEL SHIFT Diversa, the San Diego bioprospecting company, is acquiring a biofuels specialist — Celunol of Cambridge, Massachusetts — and shifting its corporate focus to clean energy. Diversa says that it will continue to try and develop drugs based on natural compounds, but will move its headquarters to Cambridge. It intends to retain an undetermined number of its 200 personnel in San Diego to do research and development. The $180 million acquisition of the privately held company is expected to be completed in June.

DRUG DROUGHT The US Food and Drug Administration (FDA) approved just 18 new drugs — ones whose active ingredient has not been marketed before — during 2006. The number of new approvals is the same as that for 2005, and the worst in recent history, apart from 2002, when only 17 new compounds were approved. In 1996, 53 such drugs won approval. Since 19 prescription medications came off patent in 2006 and became available as generics, the industry had fewer patented products on the market at the end of the year than at the start. The numbers were compiled by RPM Report, a monthly drug regulation and policy newsletter.

ALTERNATIVE CLIMATE The United States has extended its lead as the most favourable location for 'clean' energy businesses to make money, says an annual 'attractiveness survey' by Ernst & Young. The London accountancy firm says that President Bush's support for biofuels and a raft of subsidies and other measures aimed at cutting oil imports, together with the sheer size of the market, makes the United States the most promising location for such companies. India and Spain came second-equal in the rankings.

MARKET WATCH



The new year has seen some auspicious nanotechnology announcements from major corporations. On 6 February, Eastman Kodak, based in New York, rolled out nanotechnology-based ink and jets for printers. Hewlett-Packard, IBM and Intel have all announced progress in microchip performance, based on innovation at the nanoscale.

Not all this excitement, however, has been reflected in the Lux Nanotechnology Index, which tracks the performance of companies that produce and use nanotechnology products.

The index started the year drifting down, but picked up a little in February. Peter Hebert of Lux Research, the New York consultancy that compiles the index, says that good and bad company news has been pulling the index in opposite directions.

On the plus side, Oregon-based FEI, which makes scanning electron and focused ion-beam microscopes, saw its shares leap ahead from US$25 to $33 after results were released on 7 February. Its sales for the last quarter of 2006 were up 41% from the year before, to $140 million.

Investors were less impressed by NVE Corporation, a small, Minneapolis-based specialist in spintronics, and research-tools supplier Symyx Technologies, based in California. Although both companies announced that investors' profits and sales were up, the rises were not enough to satisfy their investors.

Hebert sees these companies' results as boding well. FEI's results in particular, he says, show that corporate demand for nanotechnology tools "is really ramping up". ■

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