

INNOVATION

'Accident' in lab creates super motor

AN ELECTRIC SCOOTER with a top speed of 50mph and a range of more than 500 miles has been developed by a Japanese scientist who accidentally discovered what he claims is the world's most magnetic material.

To date, most of the research on electric vehicles has concentrated on developing super-efficient batteries in an attempt to maximise their range and power-to-weight ratio. However, until now even the most advanced vehicles have required a small battalion of such batteries to achieve a modest performance. The new scooter, developed by Sciex Corporation of Japan, runs on just four ordinary 12-volt car batteries.

"Almost everyone has worked on the battery end of the problem," says its inventor, Yasunori Takahashi. "I thought: why not look at the other end — the motor?"

His breakthrough in electromagnetic technology came a few years ago while he was experimenting with new magnetic alloys. One of his laboratory staff misread his instructions and added the wrong element to the mix.

"We Japanese often confuse the Roman letters b and d," says Takahashi. "My technician added neodymium (Nd) instead of niobium (Nb). The result was extraordinary — I suddenly found myself in the presence of the most powerful magnetic material I had ever seen."

Takahashi subsequently developed a manufacturing system for producing a magnetic powder that could be formed into anything, from ultra-thin coatings to large permanent magnets. He now claims to have

A scientist who stumbled on to the world's most magnetic material saw its attraction for electric vehicles, writes **Tony Edwards**

produced a magnet with the world's highest Megagauss Oersted rating — or MgOe, the unit in which magnetism is measured. "Before my discovery, 55 MgOe was the maximum anyone had achieved; but my magnet can reach 120 MgOe," says Takahashi.

This super-magnetic force is the secret behind the new Sciex scooter's performance.

Takahashi has redesigned a conventional electric motor and fitted his super-powerful "YT" magnets, resulting in a highly efficient engine that will produce a claimed 15 horsepower from just a few amperes of electricity.

In fact, he claims the motor is so efficient that, when the scooter is throttled back and free-wheeling, the engine becomes a generator and partly recharges the batteries while on the move, giving the scooter its enormous range.

Michael Laughton, professor of electrical engineering at London University, is impressed. "It's an incredible machine," he says. "Takahashi seems to have developed an extraordinarily efficient electric motor and control system. In principle there's no reason why

it couldn't be scaled up for an electric car."

Takahashi has a good record in commercial innovation. While at Sony, he developed Beta videotape technology, which became the standard system used by the television industry worldwide until it was overtaken by VHS. He now has big plans for commercial exploitation of his new magnetic discovery.

"The YT magnet can be used for any applications where conventional magnets are currently used — from credit cards to loudspeakers, with a huge potential increase in information-storage capacity and quality," he says.

One novel use for the magnet invented by Takahashi is to extend the life of rechargeable batteries. His magnets have been made into thin inch-wide squares, which, if attached to mobile-phone batteries, will double the amount of charge they retain and so last twice as long.

This "battery doubler" is already on the market in Japan where, says Takahashi, the Japanese equivalent of BT has ordered 100,000 of them.

At present the magnetic alloys are manufactured under licence in Japan but last month Takahashi announced his intention to set up his primary manufacturing plant in Britain.

"Britain has lower overheads than many other countries and there are hundreds of engineering companies within a few hours' drive of London," he says.

A factory site has already been earmarked in north London, though Takahashi now requires a £20m investment to develop it properly.



Pulling power: a superior electromagnetic motor boosts the Sciex scooter