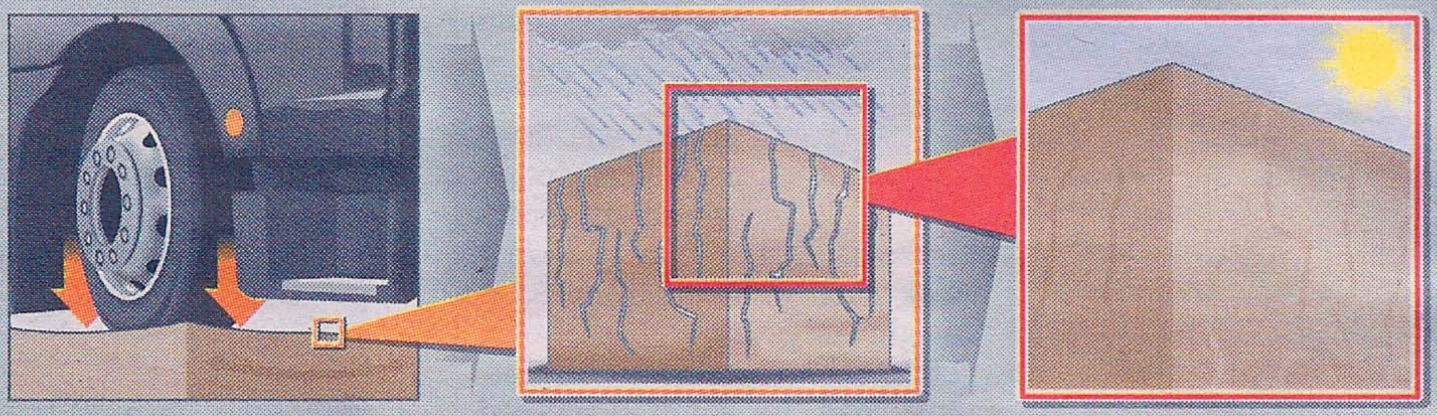
SELF-REPAIRING CONCRETE MAY CRACK THE PROBLEM

A flexible friend

1 Potholes form in normal roads when the road material starts to crack. The cracks get worse under the strain of road use and in cold weather when water freezes and expands

2 The concrete developed by Professor Li is more flexible than normal concrete, making it less likely to crack. When it does, it forms hairline fractures

3 The new concrete contains a compound that reacts with CO_2 and water, sealing the fractures before they become monster potholes



In the short term, the answer to potholes is simple — fill them in. In the longer term, road builders are looking at a new type of material that could be pothole-proof. Officially known as an engineered cementitious composite, or ECC, it is both flexible, so less likely to fracture, and capable of filling in its own cracks.

Victor Li, professor of civil engineering at the University of Michigan, whose team developed the concrete, says it reacts with carbon dioxide and water to self-repair. The kind of small cracks that lead to fissures and, eventually, gaping holes in roads disappear before they can open up to any significant size.

In laboratory tests, the material required between one and five cycles of wetting and drying to heal, so a few drizzly days would be enough to repair, say, a stretch of pavement made from the new material.

"Our hope is that when we rebuild our roads and bridges, we do it right, so that this transport infrastructure does not have to undergo the expensive repair and rebuilding process again in another five to 10 years," Li says. "It costs about three times more than regular concrete but lasts several times as long."

Li compares the self-healing properties of the concrete to living tissue: "Imagine if you get a small cut on your hand, your body can heal itself. But if you have a large wound, your body needs help. You might need stitches. We've created a material with such tiny crack widths that it can take care of the healing by itself."

ECC can be made stronger still by studding it with specially coated reinforcing fibres that hold it together, even in an earthquake, and help it withstand the constant pounding of vehicles, particularly HGVs, even without steel reinforcing. Though its flexibility means it behaves more like metal than porcelain under tension, it can still be mixed and poured like conventional concrete.

The £2 billion cost of potholes
Unrepaired potholes have caused damage — minor or serious — to two-thirds of Britain's cars, according to a survey by YouGov and the Retail Motor Industry (RMI). The total repair bill is likely to run to £2 billion, the RMI says.