

Super-strong graphene to tackle pothole plague

Graeme Paton

Super-tough graphene-based roads will be introduced under radical plans to reduce the number of potholes.

Developers based in Italy will use the material as part of a trial before the end of the year to test its application in British weather. The trial is likely to take place in London.

A first trial, just outside Rome, found that it could improve cracking resistance by more than a third and claimed to boost the lifespan of a road by 250 per cent.

There are growing concerns over the state of local roads that have deteriorated in many areas in recent years, partly because of a squeeze on council finances. Recent research by the RAC indicated that more than 674,000 potholes have been reported to local councils in the past 12 months, a rise of 33 per cent in three years. A separate study found that a one-off bill to repair all potholes would be £9.7 billion.

According to the Department for Transport, "poor or defective" road surfaces were cited as a contributory factor in 539 accidents in 2017, including six fatalities and 147 serious crashes.

Graphene, discovered by scientists at the University of Manchester in 2004, is a honeycomb sheet of carbon atoms. It is the world's strongest material and has been used in a range of applications.

The new road surface, which is

known as Eco Pavé, works by adding a small amount of a graphene-based additive to asphalt, the surface used on most roads.

The product, which has been developed in Italy by two companies, Directa Plus and Iterchimica, is said to be less likely to soften in warm temperatures or harden and crack in cold weather. It reduces road wear under high loads by increasing the elasticity and strength of the asphalt. It can also be recycled.

The technology was first tested on a 1km stretch of road between Rome and the Mediterranean coast in October last year. After three months, researchers compared its performance to a newly laid stretch of conventional asphalt on the opposite carriageway.

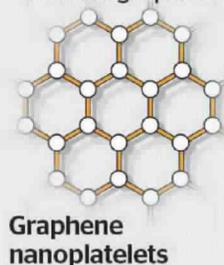
According to the companies, the graphene-based road was 35 per cent more resistant to passing vehicles. It will now be given a trial in the UK, US and Oman to test its durability.

Giulio Cesareo, the founder of Directa Plus, told *The Times*: "The first real benefit is that it will lead to a fantastic reduction in maintenance and cost and, secondly, I see the other big advantage as fewer potholes."

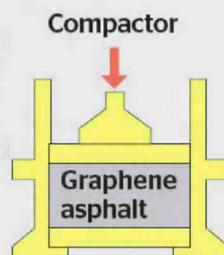
"I don't know what it is like in the UK but in Italy the maintenance of the roads is a real problem because there is simply no money. They are spending a little amount of money attempting to close the potholes and within a day or so they are back open again."

Longer-lasting roads

1 Graphene nanoplatelets are made from thin layers of natural graphite



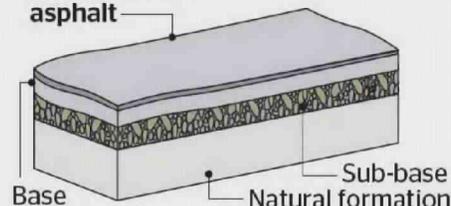
2 The graphene is compressed with asphalt at 130C



3 ● The new type of asphalt lasts 250% longer

● 35% increase in strength

New graphene asphalt



● At 40C it is 46% less prone to buckling

● Track ruts left by tyres reduced by 35% at 60C