

Nano-agents that strip for action

Nanotechnology has invaded the fuel tank. But forget Prince Charles's "grey goo" and science fiction tales of rampaging swarms of nano-robots. This invader is a harmless diesel fuel additive, and just a teaspoon in your tank can not only increase your fuel economy by up to 10 per cent, but significantly cut harmful exhaust emissions. Composed of nano-scale particles between eight and 12 billionths of a meter across, Envirox is the result of four years of development by Oxonica, a spin-off company from Oxford University.

The active ingredient is cerium oxide, an industrial catalyst used in the catalytic converters of petrol vehicles. By adding it to the fuels itself, scientists at Oxonica realised they could get the catalyst where it would do most good – in the cylinders of the engine during combustion. But to achieve that they had not only to shrink the individual particles, but also to stop them clumping and settling in the tank.

Their ingenious solution is a special polymer coating that keeps the particles isolated and suspended in the fuel until it reaches the cylinder, where the ignition phase melts the jacket, exposing the catalytic surface.

Division into such tiny particles gives the cerium oxide an enormous surface area with which to perform wonders, even over the split second of fuel ignition. Envirox works by modifying the combustion profile – the carbon in the fuel burns at a lower temperature, resulting in a much cleaner reaction. More of the stored energy is released, ultimately reducing consumption, engine wear and tear is dramatically diminished and the more efficient combustion produces far fewer pollutants as well as a significant reduction in global-warming carbon dioxide emissions.

Although Envirox has been formulated for use only in diesel fuel so far, it can be used in an engine without modification, and extensive testing is said to have shown that it does not interfere with the normal running of an engine. This, coupled with the increased fuel economy, has motivated extensive commercial trials of Envirox worldwide. Most recently in 2004, Stagecoach, the transport company, undertook a 12-month trial with 1,000 of its buses using Envirox-enhanced fuel under normal commercial conditions. Stagecoach has now decided to use Envirox for its entire 7,000-strong fleet.

Bob Swarup and Lewis Dartnell

Bob Swarup and Lewis Dartnell came first and second in the older category of the 2004 BASF/Daily Telegraph science writer competition. The closing date of the 2005 competition is April 30. For more details of how to enter, ring 0870 1267 458, e-mail enquiries@science-writer.co.uk or write to The Daily Telegraph and BASF Science Writer Awards 2005, PO Box 5, Colchester CO2 8GE