See what you're spewing as you speed along

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In future drivers may only have to glance at the dashboard to see the pollution spewing out of their vehicle's exhausts.

A team from The University of Manchester has constructed a laser measuring device capable of recording levels of carbon dioxide, carbon monoxide and methane from directly inside an exhaust.

Once optimised, the process could be incorporated into onboard diagnostic systems that would monitor emissions as vehicles drive along – and potentially help people reduce their emissions by adjusting their driving style.

Reporting in the Optical Society of America's journal *Applied Optics*, academics claim this approach is faster and more sensitive than the extractive techniques normally used to monitor emissions.

In an MOT test, for example, exhaust emissions are extracted into a box while the engine is idling and the gases present are then measured.

The University of Manchester team employed a device known as a 'near-IR diode laser sensor' to measure the variation in gas concentration during changes in the operating conditions of a Rover engine, such as increasing and decreasing the throttle, adjusting the air to fuel ratio, and start-up.

"This is the first instance of this type of near-IR diode laser sensor being used directly in the exhaust of a static internal combustion engine to

measure emissions," said Dr Philip Martin, one of the paper's authors.

The team say the components for the device are readily available and the near-IR technology allows highly accurate readings to be taken and also cuts out interference.

In the studies reported in Applied Optics, the near-IR device used two diode lasers operating at different frequencies; one detecting carbon monoxide and carbon dioxide and the other detecting methane.

The team measured the emissions produced by a Rover K-series car engine mounted on a test bed – but they have also taken the process outside the laboratory and measured exhaust emissions in passing vehicles.

"Components handling the high sensitivity and robustness required to apply this approach in the real world are only now becoming available," added Dr Martin. "We have already constructed a battery-powered roadside unit using the same technology, employing rugged and robust telecommunications components."

The next steps will be to fully quantify the technique and add additional lasers for other key emissions such as nitrogen oxide, nitrogen dioxide and specific hydrocarbons.

Source: University of Manchester