

## A unique opportunity for Knowledge Exchange - from Space to Motorsport!

### Novel semiconductor sensors in X-ray detector technology allowing In situ measurement of engine oil quality

#### The Opportunity

The Space Research Centre is looking to partner with companies and industries that would be interested in developing, and ultimately gaining commercial benefit from, the technologies detailed below.

#### The Project

The Space Research Centre, University of Leicester, is developing, in collaboration with other groups, novel semiconductor sensors for X-ray spectroscopy. These new sensors are based on Silicon Carbide (SiC) and are able to operate at room temperature and above.

The analysis of oil contaminants has both engine performance and environmental importance for the motorsport and automotive industries.

The Government and the Motorsport Industry Association's *Energy Efficient Motorsport* initiative, the *Clean Racing* initiative and other programmes such as EMDA's *Transport Technology Programme*, have identified automotive efficiency as a high priority area.

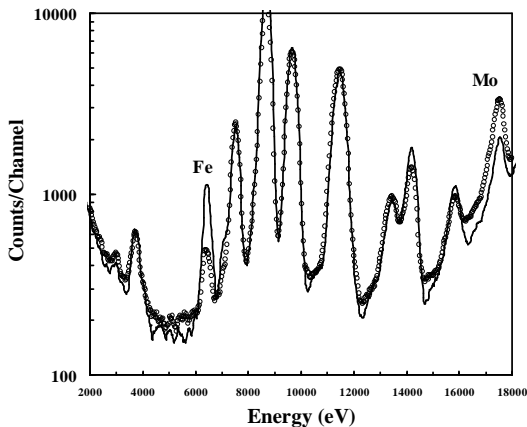


Figure 1: Comparison of X-ray fluorescence spectra of old (solid line) and new (circles) motor oil.

Each peak is the X-ray signature of a specific element.

Iron, an engine wear product, is present at about three times higher concentration in the old oil than in the new. Molybdenum, from the additive molybdenum disulphate, is depleted by use.

Existing silicon detectors need to be cooled (to  $-20^{\circ}\text{C}$ ) and are therefore not suitable for in situ measurements of real-time engine wear. Our new SiC sensors offer the prospect of measurements, in real-time, in working engines. Conventionally, radioactive sources are used to excite the material, providing the fluorescence signature to be detected. However, our system replaces the radioactive source with a battery operated non-radioactive 'cold' X-ray source.

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