

# Oil more easily converted into petrol thanks to a smart observational technique

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Catalysts are needed to convert crude oil into petrol and other fuels. However, a technique for accurately determining how well individual catalyst particles work or continue to work was not available.

NWO researcher Bert Weckhuysen and his team from Utrecht University in collaboration with the company Albemarle Catalysts, have now succeeded in imaging how well the particles do their work. As a result of this research better catalysts can now be found. This will enable the [oil industry](#) to continue producing qualitatively good fuels from the dwindling reserves of crude oil that are often of a poor quality. The research was published in the November issue of *Nature Chemistry*.

The catalysts used by [oil refineries](#) are smart, minuscule [sand grains](#) full of pores and ‘acid sites’. The oil particles, long hydrocarbon chains, creep into the pores and are chopped into shorter chains at the acid sites. This is the so-called cracking of crude oil. These shorter hydrocarbon chains can then be combusted as petrol or diesel in a car engine.

‘Everyone had always thought that each cracking [catalyst](#) sphere had about the same activity and that active sites were spread equally over the grain. Yet the reality is very different,’ says Weckhuysen. ‘Under a fluorescence microscope we made a 3D map of the active sites in such spheres. We can detect those sites using thiophene. As soon as such a molecule is in the vicinity of the acid sites it emits green fluorescing light.’ Knowledge about these active acidic sites can be used to select the most effective catalysts. That will make it easier to convert oil into

petrol. Furthermore, using this technique it can be seen when the particles become less active and therefore need replacing.

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