Quantum physics paves the way for new chemical products

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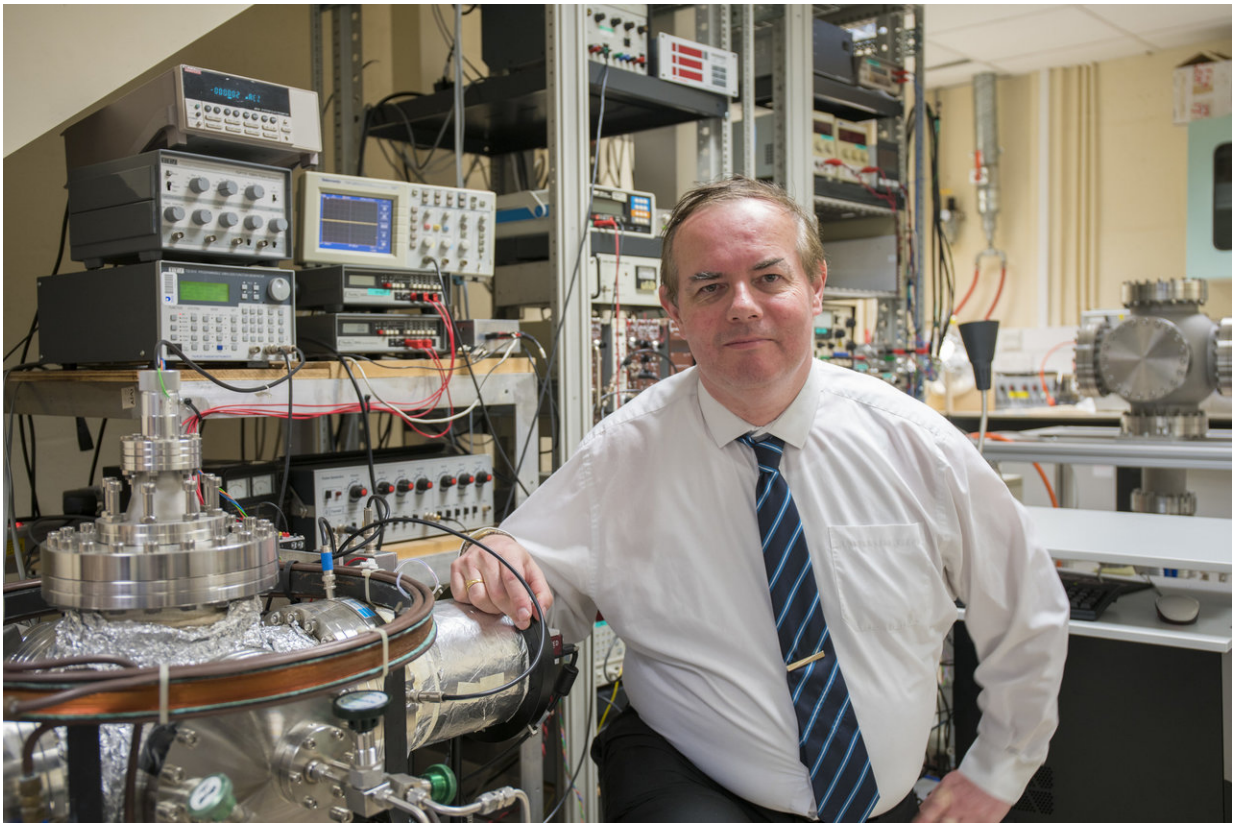


Professor Nigel Mason with the Velocity Map Imaging spectrometer. Credit: Open University

Research by an OU molecular physicist has discovered that electrons can control chemical reactions in experiments leading to purer, cheaper

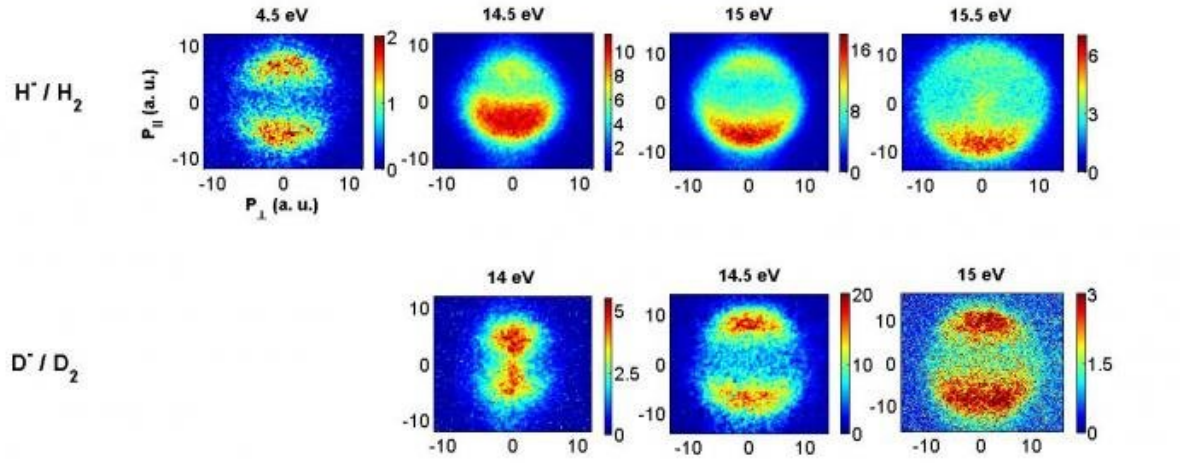
chemical products.

The research, published on Monday 16 October 2017 in *Nature Physics*, has discovered electrons displaying their own quantum mechanical nature (ie its state, such as its momentum and position), can induce coherence in other molecules.

Observing these low energy electrons, physicists from both The Open University and Tata Institute of Fundamental Research, Mumbai, have discovered that chemical reactions can be controlled using electrons – rather than lasers, which are currently used – providing a much cheaper alternative to controlling chemical reactions. This has applications in the manufacturing of new chemical products that can be used in industry, including new drugs for cancer therapy and new electronics for computers.

Professor of Molecular Physics in the School of Physical Sciences at The Open University, Nigel Mason, is leading on the research; he said:

"The ability to control chemical reactions is one of the major goals in chemistry; it would enable scientists and the manufacturing industry to reduce production costs and waste by targeting only the chemicals they want. The discovery that an electron rather than a laser can control the process means that this is approach is cheaper and faster."



Momentum images of H from H2 and D from D2 at different electron energies. The one at 4 eV for H is symmetric, while those above 14 eV are strongly asymmetric. The asymmetry in D is less pronounced and appear to change direction with change in electron energy. Credit: E. Krishnakumar et al, *Nature Physics*

More information: E. Krishnakumar et al. Symmetry breaking by quantum coherence in single electron attachment, *Nature Physics* (2017). DOI: 10.1038/NPHYS4289

Provided by Open University