Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation

UCL spin-out Quantemol helps industries accelerate tech innovation

Specialist chemical modelling software developed at UCL is supporting innovations in technologies from spacecraft propulsion to telecommunications.

“We provide specialist software to companies whose technologies rely on complex chemical interactions taking place under exacting conditions, for example in the manufacture of silicon chips,” explains Professor Jonathan Tennyson (UCL Physics & Astronomy), chief scientist of Quantemol, the UCL spin-out he established in 2004 with Dr Daniel Brown (UCL Computer Science).

The company develops and licenses software tools that simulate what happens to atoms and molecules in their plasma phase – an unstable state that gases can reach under extreme heat or low pressure.

Informed by research at UCL, its products have been widely used by companies in the semiconductor industry. It is now helping customers in industries as diverse as medical devices and generating cheap energy through fusion.

The research is helping manufacturers gain a better understanding of quantum-level processes for molecules that [illegible] experimentally.

“By reducing experimental trial and error, we are speeding up the innovation process, so that products reach the market more quickly,” adds Professor Tennyson.

Water-based technology helps fuel improvements in materials for car batteries

A ‘green’ technology developed at UCL is providing faster ways to discover new materials for more sustainable high-performance batteries that will help to increase the range of electric cars and reduce vehicle charging times.

Chemists at UCL have developed a high throughput chemical process to produce tiny metal oxide nanoparticles – a thousand times smaller than the width of a human hair. The technology can be used in several applications from batteries to healthcare products.

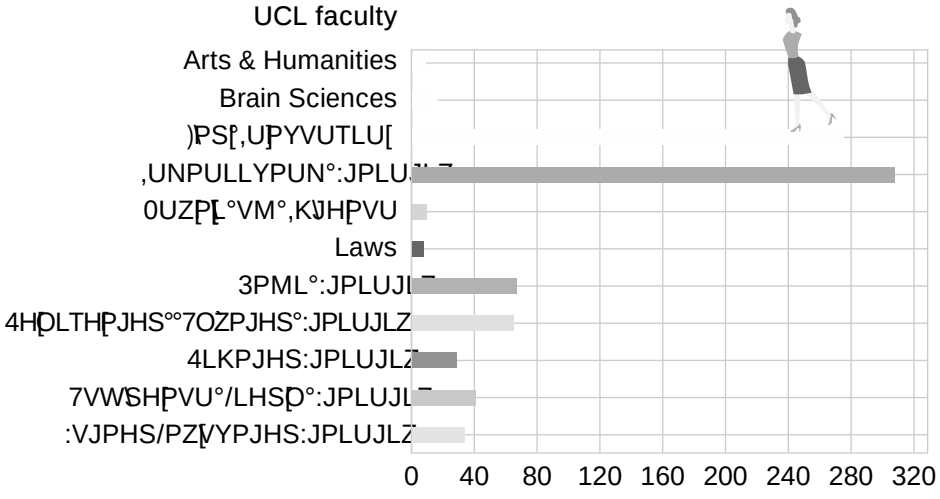
“Only a handful of similar [illegible] like this are known in the world,” explains Professor Jawwad Darr (UCL Chemistry), Head of UCL’s Clean Materials Technology Group.

[illegible] mixing superheated water (higher than 450 °C) with metal salts in a controlled way, without the need for toxic organic solvents. ▸

who is leading the research. By replacing this with appropriate amounts of industry by-products Z\JO HZ Å` HZO HUK NYHUKS (pictured, right) blast furnace slag, we are aiming to save energy and reduce CO_2 emissions."

Using X-ray imaging, the researchers can check for irregularities and defects in the JY`Z[HS Z[Y\J[\YL [OH[JV\S\ HHLJ[the concrete's performance. "If chemical reactions within the cement are suboptimal, the concrete weakens, which can end in disaster," warns Professor Robinson. For example, adulterated cement contributed to the widespread collapse of buildings during the 1999 earthquake in Izmit, Turkey (pictured, right).

Number of UCL's research publications supporting SDG9 by faculty in 2016–20



Graph based on keywords searches of publication databases

25.9%

of UCL's SDG9-related publications are in the top 10% most cited for all research of similar papers in 2016–20

Source: Scopus and Clarivate – see methodology

56.5%

of UCL's SDG9-related research publications are international collaborations, 2016–20

Source: Scopus and Clarivate – see methodology