New star-shaped molecule breakthrough

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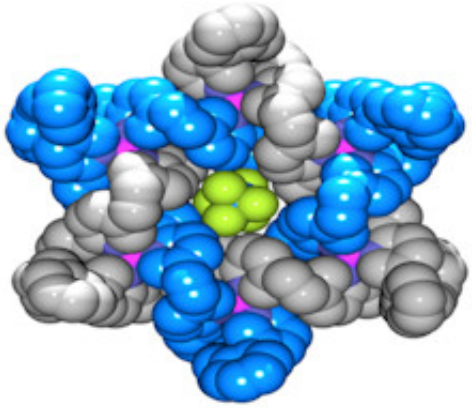

Atoms in the Star of David molecule. Credit: University of Manchester

(Phys.org) —Scientists at The University of Manchester have generated a new star-shaped molecule made up of interlocking rings, which is the most complex of its kind ever created.

Known as a 'Star of David' molecule, scientists have been trying to create one for over a quarter of a century and the team's findings are published at 1800 London time / 1300 US Eastern Time on 21 September 2014 in the journal *Nature Chemistry*.

Consisting of two molecular triangles, entwined about each other three times into a hexagram, the structure's interlocked molecules are tiny – each triangle is 114 atoms in length around the perimeter. The molecular triangles are threaded around each other at the same time that the

triangles are formed, by a process called 'self-assembly', similar to how the DNA double helix is formed in biology.

The molecule was created at The University of Manchester by PhD student Alex Stephens.

Professor David Leigh, in Manchester's School of Chemistry, said: "It was a great day when Alex finally got it in the lab. In nature, biology already uses molecular chainmail to make the tough, light shells of certain viruses and now we are on the path towards being able to reproduce its remarkable properties.

"It's the next step on the road to man-made molecular chainmail, which could lead to the development of new materials which are light, flexible and very strong. Just as chainmail was a breakthrough over heavy suits of armour in medieval times, this could be a big step towards materials created using nanotechnology. I hope this will lead to many exciting developments in the future."

The team's next step will be to make larger, more elaborate, interlocked structures.

More information: "A Star of David catenane." David A. Leigh, Robin G. Pritchard & Alexander J. Stephens *Nature Chemistry* (2014) DOI: 10.1038/nchem.2056

Provided by University of Manchester