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Combining nanomagnetics with molecular machines

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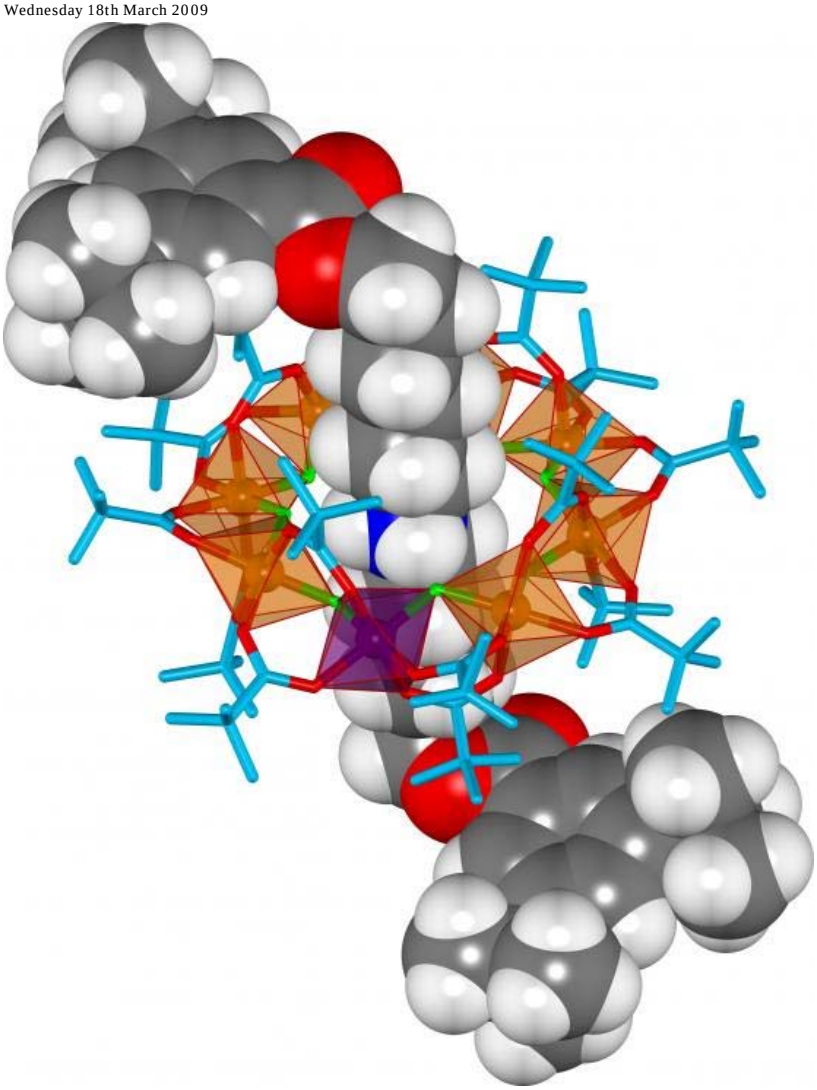

The molecular device: now for the switch

Scientists at the Universities of Edinburgh and Manchester have combining nanomagnets with molecular machines that can shuttle between two locations without the use of external force, which could be of use as the basic quantum computer component. The molecular device could act as a building block for future generations of quantum computers. The break through research was funded by the European Commission and is published in the journal Nature.

Quantum computers will use quantum binary digits, or qubits, capable of representing not only the traditional zero and one, but a range of values simultaneously. This complexity will enable quantum computers to perform intricate calculations much more quickly than conventional digital computers.

Professor David Leigh (right), of the University of Edinburgh's School of Chemistry and the Mechmol guru says the "development brings super-fast, non-silicon based computing a step closer. The magnetic molecules involved have potential to be used as qubits, and combining them with molecular machines enables them to move, which could be useful for building quantum computers.

"The major challenges we face now are to bring many of these qubits together to build a device that could perform calculations, and to discover how to communicate between them."

At the University of Manchester's School of Chemistry, Professor Richard Winpenny, (left) said: "To perform the computation, we have to have states where the qubits speak to each other, and others where they don't - rather like having light switches on and off. Here we have shown we can bring the qubits together, control how far apart they are, and potentially switch the device between two or more states. The remaining challenge is to learn how to do that switching, and that's what we're trying to do now."

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