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Molecules

World's most advanced molecule maker created

IANS Jan 11, 2013, 03:16PM IST

Tags: University of Manchester School of Chemistry | Molecule maker | molecule | David Leigh

LONDON: Inspired by nature, scientists have created the world's most advanced molecular machine that will revolutionise the manufacturing process.

A molecule is the smallest and most basic part of matter that can exist independently. For instance, a molecule of sugar will exhibit all the properties of sugar such as taste, colour, etc.

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"The development of this machine, which uses molecules to make molecules in a synthetic process, is similar to the robotic assembly line in car plants," explains [David Leigh](#), professor at the University of Manchester School of Chemistry, who led the team.

"Such machines could ultimately lead to the process of making molecules becoming much more efficient and cost effective," he added, according to the journal Science.

"This will benefit all sorts of manufacturing areas as many human-made products begin at a molecular level. For example, we're currently modifying our machine to make drugs such as penicillin," added Leigh, according to a Manchester statement.

The machine is just a few nanometres long (few millionths of a millimetre) and can only be seen using special instruments. Its creation was inspired by natural complex molecular factories where information from DNA is used to programme the linking of molecular building blocks in the correct order.

The most extraordinary of these factories is the ribosome, a massive molecular machine found in all living cells, which has inspired Leigh's machine.

It features a functionalised nanometre-sized ring that moves along a molecular track, picking up building blocks located on the path and connecting them together in a specific order to synthesise the desired new molecule.

Leigh says the current prototype is still far from being as efficient as the ribosome. "The ribosome can put together 20 building blocks a second until up to 150 are linked. So far we have only used our machine to link together four blocks and it takes 12 hours to connect each block."

"But you can massively parallel the assembly process: We are already using a million of these machines working in parallel in the laboratory to build molecules," Leigh added.

"The next step is to start using the machine to make sophisticated molecules with more building blocks. The potential is for it to be able to make molecules that have never been seen before. They're not made in nature and can't be made synthetically because of the processes currently used," concludes Leigh.

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