

Scientist Who Monitors the Chitchat of Molecules

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THIRUVANANTHAPURAM : Can there be a molecular detective that can sense every activity of another molecule? Why not, quite possible in the near future using supramolecular architectures, says A Ajayaghosh, CSIR Outstanding Scientist at CSIR-NIIST.

His research in the field has qualified him to be the recipient of the World Academy of Sciences award in Chemistry. He will be receiving the award at a function in Muscat, Sultanate of Oman, on October 26. The prize money of \$ 15,000 will be shared with

Chung-Yuan Mou of National Taiwan University's Department of Chemistry in Taipei, Taiwan, China.

"I design supramolecular structures. It is similar to an architect constructing a building. Supramolecular structures are formed when two or more molecules are allowed to interact with each other," says Ajayaghosh.

'Interact' sounds like a conversation between molecules. Indeed it is like a light-hearted chitchat. For, unlike a macromolecular structure (eg. polymers), supramolecular structures are not bound by strong chemical bonds. Molecules, without changing their chemical composition, exist together like a team.

Supramolecular structures have several applications in biology, cosmetics, food technology and electronics-organic semiconductors, cosmetic gels and jelly food products. Ajayaghosh is particularly interested in fluorescent molecular assemblies, which are supramolecular structures that can absorb light, and emit it.

Making use of this property, if fluorescent tags can be attached to, say, a protein molecule or a cell tissue, the tag can monitor the structure and dynamics of the second molecule. An imaginative scientist can think of other applications. "What if we put fluorescent strips on currencies, so that it cannot be easily reproduced? Using the fluorescent property of supramolecular structures, perhaps we can design a strip which would absorb green light to emit red light. If this technology is cost-effective, fluorescent strips can be used for document security. Or we can make fluorescent gel which would glow and issue warning signals, when it detects a poisonous material or a bomb. These are the applications I can think of. Someone else might be able to come up with other applications," says Ajayaghosh.

Will we be seeing such products in the future? "My field is fundamental research. Anyone interested from the industry can now research using the information available from my studies to develop products. They will have to ensure a stable, non-toxic, cost-effective product," he says.

The scientist won Infosys Prize for Physical Sciences in 2012 for his studies in developing superior light harvesting devices, devices which convert light into other forms of energy or light of another wavelength. In 2007 he won the Santhi Swarup Bhatnagar Prize in Chemical Sciences.

As a scientist who has spent all his life studying and working in Kerala, he hopes that more brilliant minds stay back in the state and choose science as a career option. "The success of Chandrayaan and Mangalyaan shows that we are capable. Even if 1 to 2 per cent of the most brilliant students decide to opt for science and not engineering or medical fields, we will be able to make greater leaps in science," he says.