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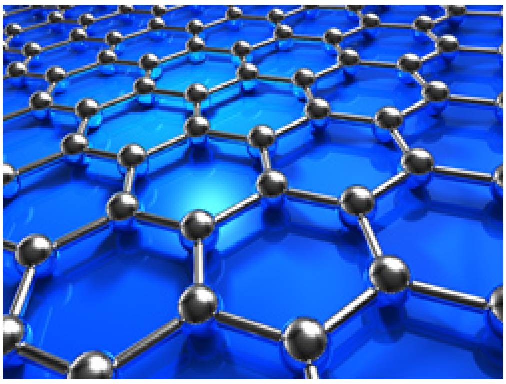
Rational Design and Characterisation of Supramolecular Architectures on Surfaces

Results in Brief

Extending the production of molecular nanostructures

Nanotechnology and the nanosciences have to do with the development of functional systems on the scale of nanometres, or the size of atoms and molecules. EU-funded researchers made a significant breakthrough in technology that could enable industrial-scale production of nanostructures, paving the way for a new generation of commercially available devices with radical new functionality.

INDUSTRIAL TECHNOLOGIES



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One of the many subfields of nanotechnology is related to the interaction of nanostructures with biological materials. In particular, molecular self-assembly refers to the bottom-up construction of molecular entities on a substrate to produce a system designed to have specific physical and chemical properties.

The 'Rational design and characterisation of supramolecular architectures on surfaces' (Radsas) project was initiated to develop methodology for parallel fabrication of nanodevices on an industrial scale, opening the way for commercially viable nanoscale assembly. In order to achieve their goals, the researchers focused on developing efficient strategies for parallel two-dimensional (2D) molecular self-assembly on novel substrate surfaces to provide the speed and quantity of production necessary for industrial relevance.

Although the term self-assembly appears to refer to an automatic process, in fact the process is guided in a way that has largely to do with how the molecules interact with or adhere to the substrate. Thus, the team focused on design for binding site selectivity both of the molecular building blocks among themselves as well as their selectivity for the substrate. The researchers developed two substrates, one based on a silver/platinum combination and one using gold. Extensive tests demonstrated that both could be used successfully for site-specific anchoring and guided assembly of molecular building blocks. The team then used the concepts for fabrication of a large range of supramolecular architectures that they characterised extensively via experimental and theoretical studies.

Thus, the Radsas project resulted in validation of the use of substrate and molecular building block specificity in the controlled self-assembly of specific supramolecular architectures on an industrial scale. The outcomes may provide the turbo-boost needed to get nanotechnology out of the lab and into industrial production processes, providing new and promising functionalities in fields as diverse as information technology and medicine and providing a significant edge to the European economy in the rapidly growing field of nanotechnology.

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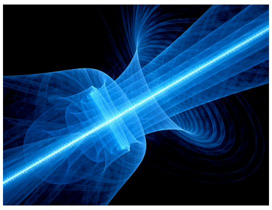

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Project Information

RADSAS

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Project website

Project closed

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