

**Applying Molecular Science and Sustainable Manufacturing - The convergence of advanced sciences and technologies**

The Institute of Organic Synthesis and Photoreactivity (ISOF) is a strategic institute in the Chemical Sciences and Materials Technologies (CSMT) Department of CNR. Chemistry is the building block of nanosciences and advanced sciences and technologies convergence - ISOF plays a major role in this field. ISOF aims to develop and apply molecular science and sustainable chemical manufacturing towards the EU's energy and climate objectives, whilst also improving quality of life and local economies. The institute is focused on the target of ensuring a secure supply, and achieving efficient and sustainable management and use of non-energy consuming materials and smart technologies along the entire value chain in Europe. ISOF scientists are at the forefront of research on design and synthesis of organic-inorganic hybrid materials, lipidomics and nutraceuticals, fundamental photochemical and photophysical processes enabling innovative organic based optoelectronic devices for renewable energies, organic solid state lighting and bio-nano-medicine. Carbon-based nanosystems including graphene, are recognized state of the art research activities of our nanochemistry and molecular photoscience research lines. Synthesis of active biological compounds in the field of antibiotics and antitumor drugs and drug delivery - mediation by nanoparticles are recognized strategic activities of ISOF. ISOF uses natural silk as a platform for bio-optoelectronics, electrogenic cell systems interfaces and living technologies.



Fig.1

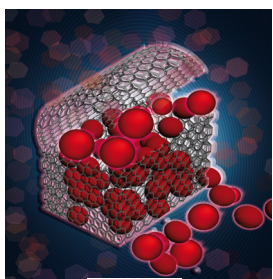


Fig.2

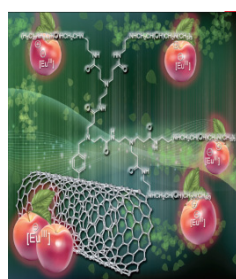


Fig.3

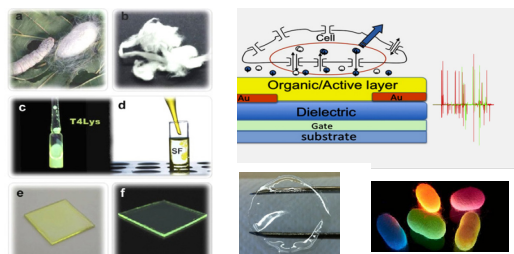


Fig. 4

Fig. 1 - A graphite sample expanded up to 40 times the original volume using electrochemistry, used for research on graphene production.

Fig. 2 – Inorganic complexes of europium , “phosphors”, inside carbon nanotubes (first time reported by ISOF).

Fig. 3 - Europium complexes (red emitters) anchored to the external wall of the carbon nanostructures.

Fig. 4 - Silk-fibroin biopolymer thin film applied to bio-optoelectronics, sensing and biodiagnostics devices.



**Our achievements:**

ISOF is a proposer and Work package leader of the GRAPHENE FLAGSHIP pilot, a large-scale European initiative on graphene research and industrial development. ISOF promoted and lead the CNR-Emilia-Romagna Region Technopole AMBIMAT, the regional initiative on micro-nano technological platform on smart environment and innovative ecosustainable materials for manufacture. ISOF is partner of the National MIUR Project “Chemical Compound Collection and Screening Activity” (CCCaS). National Flag Projects: ISOF coordinate a project of “The Factory of the Future” and is partner of NANOMAXX. ISOF is leading, coordinate and participate to n.8 ongoing EU Projects, n.7 private contracts with SMEs and Industries, n. 13 Projects financed by Public funds. ISOF generated n. 3 spin-off: Lipinutragen, Mediteknology and APM. ISOF is a reference site for the technological transfer with SMEs and Industries: ETC, Saes Getter, SACMI, among many others. ISOF Publications from 2010 to date: a total of more than 400 of high impact factor peer reviewed publications; ISOF contributes to the first OCST device (Nat. Mat. 2013). ISOF lead the CNR test plant for smart cities in the CNR research Area.

**Riferimenti:**

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