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Consiglio Nazionale delle Ricerche

Avviso di Seminario

Lunedì 20 Marzo 2023, ore 15.30

Aula Conferenze CNR-IMEM - Parco Area delle Scienze 37/a - Parma

"Soft Micro-Electronics & plastic MEMS"

Virgilio Mattioli

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Soft electronics is an exciting new field of study that aims to seamlessly integrate electronic components and devices into non-rigid, non-planar complex surfaces and objects. One promising approach to achieving soft electronics is through the use of organic and solution-based technologies. This involves developing free-standing conformable circuits made of ultra-thin films of conjugated polymers that can be directly transferred onto skin or other complex surfaces, commonly referred to as "tattoo electronics". In the first part of my talk, I will review the recent achievements of our group in this field, with a focus on future applications in personal, imperceptible healthcare monitoring devices, active tattoos, and controllable drug delivery systems. In the second part of the talk, I will move from 2D to 3D plastic devices and discuss the applicability of the two-photon polymerization (2PP) approach to the direct fabrication of micro-electro-mechanical systems (MEMS). These systems are pervasive in our daily lives and are fundamental components in countless technological applications. I will present the perspectives, requirements, and challenges of the 2PP approach, with a focus on recent results from our group in terms of MEMS fabrication and integration within the framework of the EU-funded project 5D NanoPrinting.

Bio: Virgilio Mattoli holds a Laurea degree in Chemistry with honors from the University of Pisa and a Diploma in Chemistry from the Scuola Normale Superiore of Pisa, which he earned in 2000. In 2005, he received his PhD in bioengineering with honors from Scuola Superiore Sant'Anna. During the summer of 2004, he worked as a visiting researcher at the University of Stanford, Center for Design Research, focusing on sensors and controls modules for biomimetic robotics applications. He was also a visiting researcher at Waseda University in Tokyo, Japan, in 2005 and 2008, working on the development of ultrathin freestanding polymeric films and a bio-inspired mini-robot. From June 2008 to October 2009, Virgilio obtained a temporary position as an Assistant Professor of Bioengineering at Scuola Superiore Sant'Anna (SSSA). Following this, he became a Team Leader of the Smart Materials Platform in the Center for Micro-BioRobotics of the Italian Institute of Technology (IIT) from November 2009 to July 2015. In August 2015, he obtained a permanent position as a Researcher Technologist at the same center. Virgilio's main research interests include smart nano- and bio-inspired materials, micro/nano-fabrication, soft/tattoo electronics, sensors, and biorobotics. He is currently involved in several research projects on these topics, including the EU FET Project 5D NanoPrinting, of which he is the coordinator. Virgilio has authored or co-authored around 170 articles in international journals, delivered over 40 invited talks, and contributed to several conference communications/ proceedings and deposited patents.