

UCSD NANOENGINEERING/CHEMICAL ENGINEERING
Hybrid **SEMINAR SERIES**
Friday, August 19th, 2022
Seminar Presentation: 1:00pm - 2:00pm PDT
SME room 248

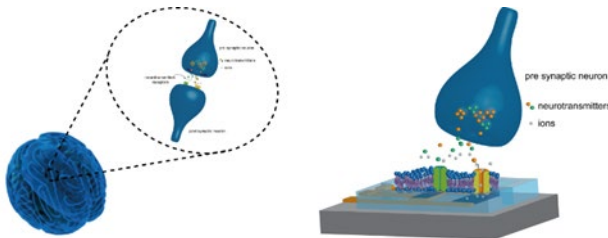


“In vitro neurohybrid electronics”

Dr. Francesca Santoro, PhD

*Faculty of Electrical Engineering and IT, RWTH Aachen, Germany.
Institute for Biological Information Processing-Bioelectronics,
Forschungszentrum Juelich, Germany. Istituto Italiano di Tecnologia, Italy.*

Abstract:



The interface between biological cells and non-biological materials has profound influences on cellular activities, chronic tissue responses, and ultimately the success of medical implants and bioelectronic devices. The optimal coupling between cells, i.e. neurons, and materials is mainly based on surface interaction, electrical communication and sensing. In the last years, many efforts have been devoted to the engineering of materials to recapitulate both the environment

(i.e. dimensionality, curvature, dynamicity) and the functionalities (i.e. long and short term plasticity) of the neuronal tissue to ensure a better integration of the bioelectronic platform and cells.

On the one hand, here we explore how the transition from planar to pseudo-3D nanopatterned inorganic and organic materials have introduced a new strategy of integrating bioelectronic platforms with biological cells under static and dynamic conditions. On the other hand, we investigate how organic semiconductors can be exploited for recapitulating electrical neuronal functions such as long term and short term potentiation. In this way, both the topology and the material functionalities can be exploited for achieving in vitro biohybrid platforms for neuronal network interfacing.

Biosketch:

Francesca Santoro received her Bachelor’s and Master’s degrees in Biomedical Engineering at the ‘Federico II’ University of Naples (Italy) with specialization in biomaterials. She received a PhD in 2014 in Electrical Engineering and Information Technology in a joint partnership between the RWTH Aachen and the Forschungszentrum Juelich (Germany) with a scholarship by the International Helmholtz Research School in Biophysics and Soft Matter (IHRS BioSoft). In October 2014, she joined the Chemistry Department at Stanford University (USA) and received a research fellowship in 2016 by the Heart Rhythm Society. She joined IIT in July 2017 as Principal Investigator of the ‘Tissue Electronics’ lab at CABHC-Naples. In 2018 she has been awarded the MIT Technology Review Under 35 Innovator ITALIA and EUROPE. She has been awarded an ERC Starting Grant in 2020. She is among the Inspiring Fifty Italy and is also the winner of the Falling Walls Science Breakthrough of the Year in Engineering and Technology in 2021. Since January 2022, she is Professor in Neuroelectronic Interfaces at RWTH Aachen and Forschungszentrum Juelich.