



## TOWARD NEW TYPES OF BIOINSPIRED DYNAMIC MATERIALS

*2 million euros for a 5 years grant at Politecnico di Torino to pave new routes for the design of innovative materials with various technological applications.*

*Giovanni Maria Pavan has been awarded a prestigious European Research Council (ERC) Consolidator Grant with his research project [DYNAPOL - Modeling approaches toward bioinspired dynamic materials](#)*

*Torino, November 20, 2019* -The ability to conceive and develop new types of materials has determined the development of humanity from the stone, bronze and iron ages to our current world, dominated by electronic materials and semiconductors (silicon, etc.). The DYNAPOL project will explore new routes to design new types of artificial materials for various technological applications.

Giovanni Maria Pavan - Full Professor at Politecnico di Torino since 2019 will develop his DYNAPOL research project in five years thanks to the 2 million of funding. An ambitious research program spanning several scientific fields: molecular simulation, computational physics-chemistry, supramolecular chemistry, bioinspired materials and machine learning. Prof. Pavan's research group will develop multiscale molecular models and will use advanced computational simulation and machine learning techniques to investigate the fundamental chemical-physical principles to design new classes of artificial materials with bioinspired dynamic properties, that is similar to those of materials living. The models developed will be validated through continuous comparison with experimental data from various international collaborations.

The research that has its roots in the observation of nature and in the way this builds complex materials possessing unique properties, such as the ability to actively respond to external stimuli of various kinds - environmental (such as temperature, salt, pressure), biological (specific interactions with proteins or tissues), chemical, physical, etc. -, capable of performing complex functions working out of the thermodynamic equilibrium (consuming and transforming energy) and, in general, possessing a dynamic and "living" behavior. DYNAPOL is a so-called "paradigm breaker" project: the objective is in fact to understand how to create new classes of bioinspired artificial materials through chemical-physical concepts different from those on which the common materials for technological use are based, that is via self-assembly.

*"The nature has always inspired technology innovation allowing mankind to exceed its limits. We have built airplanes allowing us to fly, boats to move in the water - says Giovanni Maria Pavan - imagine learning from nature how to build new types of materials with unprecedented dynamical properties, active materials able to perform complex functions, to receive and exchange information communicating with the environment in a dynamic way. Those smart materials would represent a revolution in many fields. The goal of this project is to explore new ways to build bioinspired materials and to pave new routes in material sciences".*

The results of this project will find applications in various research and technologic areas of great current interest, such as biomedical, pharmaceutical, energy, chemical, as well as tracing completely new applications not yet envisaged in the field of innovative materials.

Professor Pavan has chosen Politecnico di Torino to develop his research: *“We are very proud that another young researcher has chosen our university: Politecnico di Torino is more and more considered a high-quality research center at the international level and our attraction policies are effective. Our university offers a stimulating research environment, attractive work conditions and an excellent quality of life”, says the Rector Guido Saracco. The Rector concludes saying “I wish to Giovanni to consolidate in our Institution a strong research team, to inspire students and young researchers minds and to establish fruitful collaborations with other Politecnico di Torino professors and researchers”.*



*Giovanni Maria Pavan Giovanni M. Pavan has obtained a MSc in Materials Engineering in 2006 and a PhD in Nanotechnology in 2010, both from the Università degli Studi di Trieste (Italy). In 2010 he has joined the Department of Innovative Technologies of SUPSI (University of Applied Sciences and Arts of Southern Switzerland), first as postdoc (2010-2012), then as researcher (2012-2016) and senior researcher (2017-2018). Since 2019 he is professor and Head of the Computational Materials Science Laboratory at the Institute for Mechanical Engineering and Materials technology (MEMTi) of SUPSI. Since May 2019, he is also full professor of Computational Physical-Chemistry at Politecnico di Torino, Department of Applied Science and Technology. He is co-author of more than 75 peer reviewed publications appeared in important high-impact scientific journals. His research has received various awards and competitive funding from national and international research institutions (e.g., ERC, H2020, SNSF, etc.).*