

# SUSTAINABLE MATERIALS, PROCESSES AND SYSTEMS FOR ENERGY TRANSITION

## DM 630 SOLVAY SPECIALITY POLYMERS ITALY S.r.l. - Ion Transport Mechanism in Electrochemical Devices

<b>Funded By</b>	Ministero dell'Università e della Ricerca - MUR [P.iva/CF:96446770586] Politecnico di TORINO [P.iva/CF:00518460019] SOLVAY SPECIALTY POLYMERS ITALY S.P.A. [P.iva/CF:03521920961]
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<b>Contact</b>	
<b>Context of the research activity</b>	<p>Scope: The scope of the thesis is to understand the mechanism of transport of the ions in a given conductive membrane, which could be made of a fluorinated or a non-fluorinated polymer and having or in absence of inorganic domains attached to the backbone of the polymer when it works in an electrochemical device</p> <p>Experimental Approach: Preparation of the membranes by casting and or by a dry process and implementation of the same in an electrochemical device (e.g. super-capacitors, Li-ion-batteries).</p> <p>Methodology: Electrochemical tests (performance and durability) and an analytical characterization post-mortem.</p> <p>Progetto finanziato dal PNRR a valere sul DM 630/2024 - CUP: E14D24002340004</p>
<b>Objectives</b>	<p>These membranes are in general swollen with an electrolyte solution (ES) where their behavior (mainly ionic conductivity) is higher when the higher amount of ES is present coupled with a minimum concentration of the electrolytic salt to allow the ionic conductivity. The level and type of salt is very important for the well performance of the device. A very high amount of salt could be detrimental to the well operation of the device. It is very important for the final design of these devices to understand the way these ions go from one electrode to the other and how the composition of the membrane could affect this movement. Certainly, the medium will affect the movement of the ions and this means the nature of the environment.</p>
<b>Skills and</b>	<p>Skills: Describe the skills and characteristics the candidate should have to develop the research topic (max 500 characters) Electrochemistry.</p>

**competencies  
for the  
development of  
the activity**

Experimental ability and confidence with the lab manipulations  
Thermodynamics  
Experimental capabilities on electrochemical technologies and processes  
Modeling capabilities in terms of multi-physics phenomena (electrochemical, thermal, mass transport)  
Knowledge of thermoplastic polymer process