

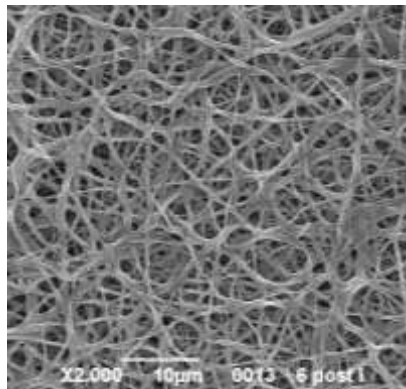
## Preparation and characterization of super-absorbent and hydrophobic membranes for textile ergonomics in alpine environment.

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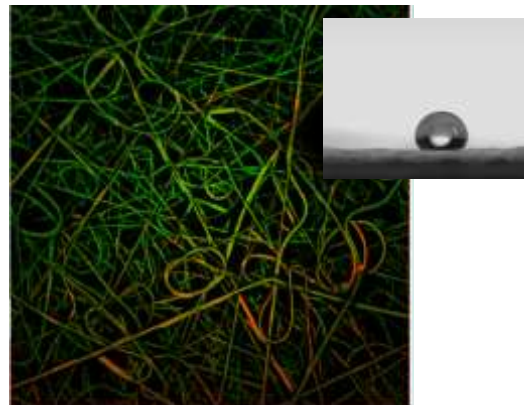
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In many extreme climatic situations, breathable fabrics protect the human body from external heat, wind, water, and many harmful agents, and at the same time it also permits effective transmission of moist vapor from inside to outside atmosphere [1]. The present work shows the development of innovative waterproof breathable membranes based on super-absorbent and super-hydrophobic layers of different electrospun materials. In order to develop super absorbent membranes, Polyacrylamide-co-acrylic acid (PAAM-co-AAc) sodium salt has been chosen as raw material, according to its well known ability to adsorb water. Moreover this polymer is water soluble and it means that it can be electrospun from water solution. Its ability to absorb water will be exploited as soon as it will be at least partially crosslinked and consequently water insoluble. This property was achieved thanks to the thermal cross-linking between the acrylic acid part of the polymer and a certain amount of polyvinyl alcohol [2]: a detailed study of the temperature-time effects was carried out in order to define the degree of cross-linking. On the other hand, a super hydrophobic electrospun membrane was produced and optimized by coaxial electrospinning, wherein a thermoplastic polyurethane (TPU) thin shell ensured flexibility and a blended polyvinylidene-polytetrafluorethylene (PVDF-PTFE) core was responsible for the waterproof behavior.



**Figure 1.** PAAM-co-AAc/PVA crosslinked super-absorbent membrane after water immersion.



**Figure 2.** Confocal image of coaxial TPU (shell-green),PVDF/PTFE (core-red). Right corner: contact angle ( $\theta$ ) measurement:  $\theta = 120.9 \pm 0.7$

**Key Words:** super-adsorbent electrospun fibers, hydrophobic fibers, coaxial electrospinning

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