

NanoTWICE

NANOcomposite NANOfibres for Treatment of air and Water by an Industrial Conception of Electrospinning

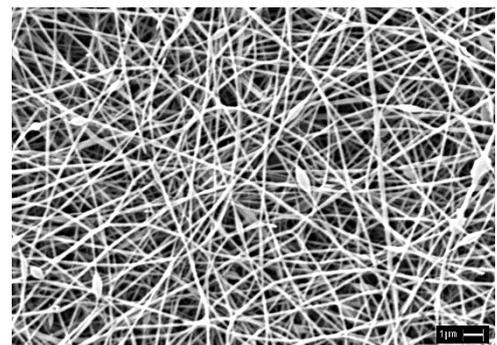
Duration	Start date	Total budget	Funding
24 months	January 15, 2013	535.150 €	300.900 €

Scientific/Industrial objective

Electrospinning is a versatile and promising technology for the production of polymer-based nanofibres. In order to achieve reliable transfer of electrospinning-based processes into relevant industrial environment a fine control of large-scale nanofibre formation is required. NanoTWICE project developed composite nanofibres for filtration by merging biopolymer processing and sol-gel techniques using electrospinning technology. The main objectives of NanoTWICE project were: production of innovative multifunctional filter media by integrating nanofibre membranes with inorganic nanoparticles; developing an electrospinning plant integrating sensors able to detect electrospinning fault and electrostatic alteration during the process; optimize machine configuration for the production of nanofibrous materials.

Ideas and solutions

The development of multifunctional filter media based on keratin nanofibres embedding ceramic nanoparticles showed properties not present in the filtration products available at the moment. In fact, the resulting filter media sums the unparalleled properties of adsorption of keratin nanofibres to the biocidal, self-cleaning and photo-catalytic properties of nanoparticles. The electrospun nanofibre-based filter media of NanoTWICE project are able to adsorb heavy-metals, dyes and volatile organic compounds, to kill bacteria and dangerous micro-organisms, and to degrade harmful organic substances from both air and water.



Follow up

NanoTWICE project outcomes can assist Italian competitiveness in key sectors such as polymer processing, biomaterials, textiles, sensors, and filtering systems by developing knowledge focused on electrospinning research activities towards filtration that is one of the most urgently required areas of innovation and materials development. By providing a technical overview and new ideas in terms of electrospinning and its applications, the project's results will be advantageous and beneficial for Italian industry entering the field of nano-materials related processing. On the other hand, the knowledge disclosed during NanoTWICE project in the preparation of stable formulations containing dispersions of active ceramic nanoparticles in functional natural protein, as keratin, is a highly innovative technological challenge.

Electrospun nanofibers have generated increasing interest in industrial sectors related to materials science in last two decades and have been proposed for several value added applications such as filtration, personal protective equipment, barriers, etc.

In addition, the fabrication of electrospun nanofibres composed of protein with inorganic nanoparticles gives to the Partners great advantages in producing materials with a huge range of applications, not just limited to filtration, but also in developing biomaterials, bioelectronics and new textile materials.

The processing manage for achieving stable production of nano-sized materials is another key factor for the success of the project. The technology that will be developed in NanoTWICE will enable the Partners in controlling a large-scale nano-materials production process for advanced applications.

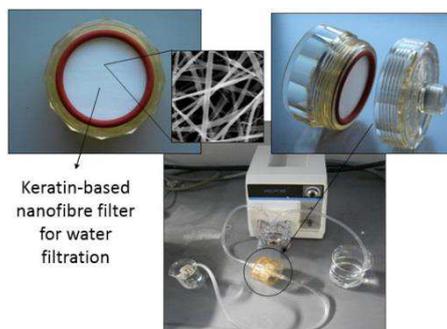
Partnership

CNR-ISMAL, Biella
CNR-ISTEC, Faenza
CNR-IMATI, Milan
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Coordinato da:



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