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Since about a decade, Textile and Fashion Department has worked on making possible the linkage between textiles and nanotechnology in their research. First on the smart textiles field, where the necessity and potential to further increase the functionality of textiles has been revealed, especially in the field of health care. Here an intense research efforts were put in the development of textile-based electrodes which can be integrated into garments [1-3]. The biosensors called "textile electrodes", in our research, consisted of two silver conductive inks screen-printed on eight different textile substrates. All printed textile biosensors showed to be promising for the use of screen-printed textile biosensors in health monitoring applications. Moreover was worked on the application of the electrospinning, first on Needleless Electrospinning of PAN Fibers, where was introduced another type of fibres production of PAN and casein. The casein was chosen as a biodegradable and eco-friendly material, which provides high comfort properties with a pH value close to the human skin in order to be applied in medical applications. The research was focused on the electrospinning and investigation of the PAN and casein fibres, in order to improve the properties of these fibres, where was observed that the fibres with concentration of 2 grams of casein showed better regularity of fibres in the nonwoven electrospinning membrane [4]. Furthermore, in the field of electrospinning, was contributed in several studies [5-6] and on the project ZEiNANOF, through preparation of the polymeric solution in different percentages, in order to study the polymer concentration influence on fiber diameter and shape, and preparation of the nano/microfibrous membranes with zeolites incorporated in the structure [7-8].

The focus of the research group at the Textile and Fashion Department in the near future is the screen printing with conductive nanoparticles ink on textile, 3D printing with conductive nanoparticles wire on textile & flexible materials and the investigation of halo-chromic at the Needleless Electrospinning for pH-sensors.

References

- [1] I. Kazani. Study of Screen-Printed Electroconductive Textile Materials. ISBN 978-90-8578-517-0, 2012
- [2] I. Kazani, C. Hertleer, G. De Mey, G. Guxho, L. Van Langenhove. Electrochemical properties of screen-printed textile electrodes. XXIII Congress of Chemists and Technologists of Macedonia. 2014, pp. 275.
- [3] I. Kazani, G. Guxho, C. Hertleer, L. Van Langenhove, B. Lair, G. De Mey, Electrochemical impedance spectroscopy and the sweat/textile electrode interface. Journal of Natural and Technical Sciences. 2016, Vol. XX (1), pp. 113-124.
- [4] Bachelor thesis, 'Needleless Electrospinning of PAN Fibers', 2019
- [5] Bachelor thesis, 'Electrospun biopolymers and their textile applications', and "Electrospun synthetic polymers and their textile applications", 2016; 'Textile-based Biomaterials', 2019; 'Production and design of water filter membranes. Materials and innovations', 2021.
- [6] Master thesis, 'Polyaniline (PAN) for smart applications', 2017; 'Production of Polyethylene Terephthalate (PET) fibers with incorporate Zeolites by Electrospinning', 2020; 'Recycling of polyethylene terephthalate (PET) plastic for the use of a filter membrane', 2021.
- [7] A. Halili, I. Kazani, M. Hylli, A. Uka, A. Reka, I. Vozga. ZEiNANOF – From the plastic bottle to flexible nonwoven membranes. 9th International Textile Conference & 3rd International Conference on Engineering and Entrepreneurship. 2021. ISBN: 978-9928-309-31-0, pp. 397-403.
- [8] A. Halili, I. Kazani, A. Uka, M. Hylli, A. Reka, I. Vozga. Production of electrospun zeolite-incorporated nano-microfibers from recycled PET. TNT 2021, Tirana, Albania.



Figure 1: Screen printed textile-based electrodes

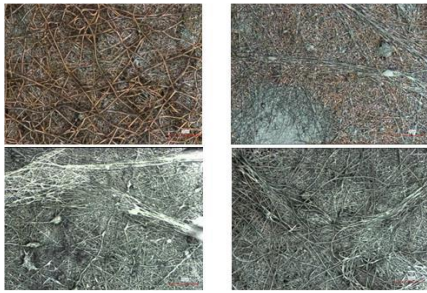


Figure 2: Microscope view of the electrospinning layer of 9.8 grams of PAN 16% and 2 grams of casein

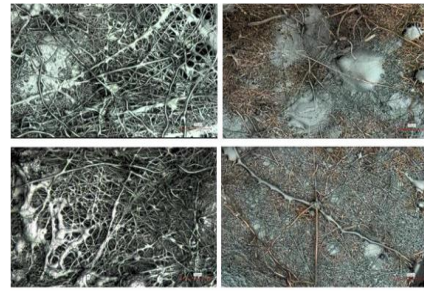


Figure 3: Microscope view of the electrospinning layer of 9.6 grams of PAN 16% and 4 grams of casein.

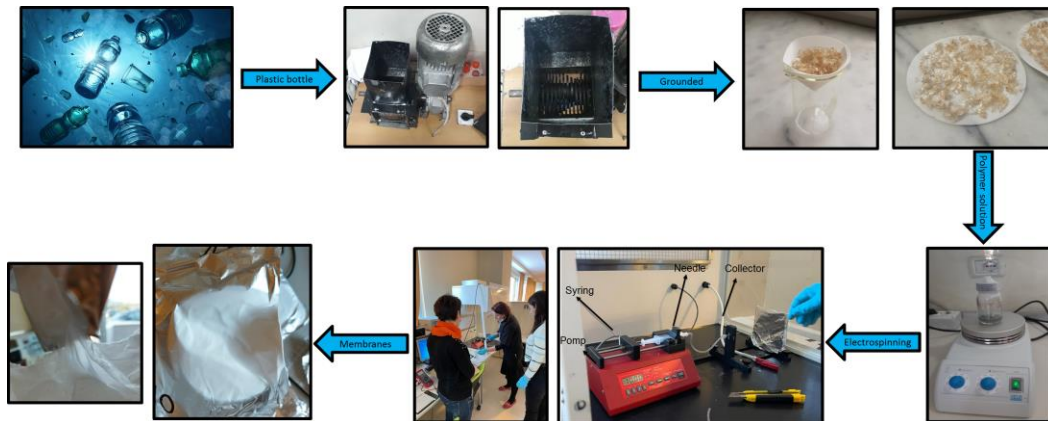


Figure 4: Recycling of plastic bottles into nano/microfibrous membranes