FUTURE MATERIALS

Materials Science & Nanotechnology Conference

February 26-28, 2020

Venue

SANA Malhoa Hotel
Av. José Malhoa 8, 1099-089 Lisbon
Portugal

16:05-16:50 Poster Session

FM-18 **FTO Electrodes Modification with a NiO-In2S3 P-N Junction and a Hydrogenase for Photoelectrocatalytic H2 Production**
Gabriel Luna-López, Instituto de Catálisis y Petroleoquímica, Spain

FM-19 **A Flexible, Smart and Self-Evolving Actuator Based on Polypropylene Mesh for Hernia Repair and a Thermo-Sensitive Gel**
Sonia Lanzalaco, University of Catalonia, Spain

FM-20 **Optimization of Charge Carrier Mobility in Nanoporous Titania Films**
Joyashish Debgupta, University of York, UK

FM-21 **High Energy Density Supercapacitor Based on Bimodal Pore Structure Carbon for AC Line Filtering**
Nayoung Ji, Korea University, South Korea

FM-22 **Mechanical Characterization of Bioceramics Gutta-Percha and Endodontic Sealer**
Adriana Marques Nunes, Universidade Federal Fluminense, Brazil

FM-23 **Hydrogenase-Assisted Catalysis on Titania Electrodes Oxides**
Patricia Carvalho, SINTEF Industry, Norway

FM-24 **Chitosan Microparticles Loaded Tannic Acid for Wound Treatment**
Sara Baptista-Silva, Catholic University of Portugal, Portugal

A flexible, smart and self-evolving actuator based on polypropylene mesh for hernia repair and a thermo-sensitive gel

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Abstract

Here, a smart mesh actuator, able to self-evolve under temperature and humidity control, has been developed. Thermo-responsive poly(*N*-isopropylacrylamide) (PNIPAAm)-based materials are widely applied in biomedical field owing to their excellent biocompatibility and abrupt conformational change at a critical temperature very close to that of human body (~32 °C) [1-2]. The actuator is based on PNIPAAm grafted on a commercial polypropylene (PP) mesh used for hernia repair [3]. Flexible devices composed of PP-g-PNIPAAm arranged in monolayer (one layer of PNIPAAm) and bilayer (two layers of PNIPAAm) conformations were synthesized. The *microstructure* of the gel chains (chain length measurements) and the *macromotion* (unfolding angle observations) behavior of the composite mesh in water and air at different temperatures were studied. The motion is affected by the amount and the position of the gel (upper fibers or among them) and by the crosslinking degree. For the first time, a self-evolving motion sensor based on commercial hernia repair mesh has been produced by using a biocompatible hydrogel. The strategy can be easily extrapolated to complex mesh architectures.

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[1] S. Lanzalaco and E. Armelin, Gels 2017, 3, 36.

[2] Y. Yakimoto et al., ACS Appl. Mater. Interfaces, 2015, 7, 20, 11002.

[3] S. Lanzalaco et al., Soft Matter, 2019, 15, 3432.

Biography

Sonia Lanzalaco is a chemical engineer and PhD by the University of Palermo (Italy). Her research interest is focused on materials science and polymer technology, having expertise in materials synthesis and characterization, as well as in supercritical and electrochemical methods. During her PhD (co-funded by LIMA Corporate) she spent a period as Visiting Researcher at CMU in Pittsburgh (USA) under the supervision of Prof. Krzysztof Matyjaszewski. Since 2017, as a Marie Skłodowska-Curie postdoctoral researcher at the Polytechnic University of Catalonia (UPC, Barcelona), she is developing innovative and smart polymer-based materials for hernia repair in collaboration with BBraun Surgical.