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PROCEEDINGS

Flexible conducting material based on starch and PEDOT:PSS

Gabriella Siqueira de Oliveira[1], Danilo dos Santos[2,3], Antonio Carlos Roveda Junior[4], Giovani Gozzi[5]

[1]Sao Paulo State University, Institute of Geosciences and Exact Sciences (IGCE) (*Departamento de Física*) , [2]Sao Paulo State University, Institute of Geosciences and Exact Sciences (IGCE), [3]Poly Inks, [4]Universidade Estadual Paulista "Júlio de Mesquita Filho" (*Departamento de Física - IGCE*) , [5]Sao Paulo State University, Institute of Geosciences and Exact Sciences (IGCE) (*Physics*)

e-mail: gabriella.siqueira@unesp.br

Advances in electronics have transformed modern life, and several new electronic devices are made available on the market every year. Thus, one of the most important challenges is the reduction of electronic device lifespans due to their rapid obsolescence and the constant cycle of new model launches. At the same time, bioelectronics emerges as a potential solution to these challenges, and it opens up new opportunities for electronic material application. In this research field, the combination of organic electronic materials with natural ones is promising to achieve short-lasting and biocompatible electronic devices [1].

For this reason, water and starch, both abundant resources, are chosen for manufacturing electronic materials [1]. In this work, we have synthed a starch-based conductive material with a conducting phase composed of poly(3,4-ethylenedioxythiophene): polystyrene sulfonate (PEDOT:PSS). We created starch-based gels according to the procedures described in the reference, and we used the drop casting method to produce thick films.

Through the application of this technique, we were able to make 15 ± 2 μm thick films with mechanical properties comparable to the pristine starch film and containing 20, 40, or 60% w/w of PEDOT-PSS. The resistivity (ρ) of the films ranged from 129 kΩ to 0.053 kΩ. As a result, we have presented a preliminary investigation regarding the introduction of a conductive material based on starch with potential applications in biodegradable and biocompatible electronics.

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References:
[1] MIAO, J.; LIU, H.; LI, Y.; ZHANG, X. Biodegradable Transparent Substrate Based on Edible Starch Chitosan Embedded with Nature-Inspired Three-Dimensionally Interconnected Conductive Nanocomposites for Wearable Green Electronics.