When smart Polymers meet biology

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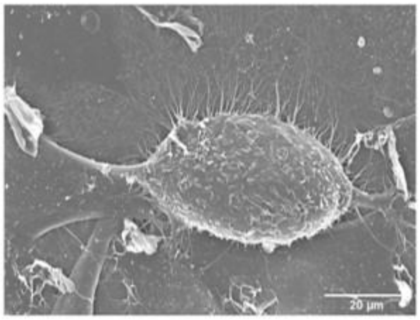
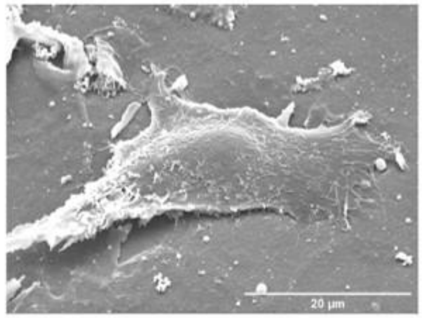
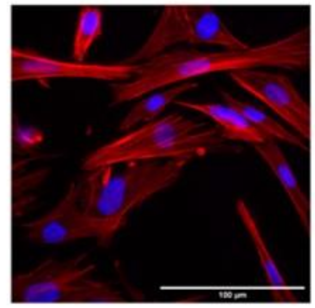

Electricity and Chemistry. Is it possible to combine them to get something good and useful for everyone's life?
The answer is YES! And we can play around by using **conductive polymers**!

Conductive polymers (CPs) are a class of organic materials that exhibit electrical and optical properties of both metals and semiconductors; in very few words they are organic materials able to conduct electricity.
The question is: "*What can we do with these conductive polymers*?"
Some of these polymers showed very high biocompatibility so they can be used in different ways, for instance, for **medical applications**. In addition to that, their conductivity can be exploited for electrical stimulation which is well known to be a good input for several phenomena such as cell growth, proliferation and differentiation.
This is exactly what has been done in our latest paper where a widely used conductive polymer*, PEDOT: PSS*, has been used as a layer to support fibroblast (the cells of the skin) to find the best morphology and composition more congenial to cells.
It is well known that a rough morphology helps the cells to cling, remaining well attached to the substrate. This phenomenon does not happen on smooth surfaces where cells instead it tends to slip.
In this paper, the authors mixed the conductive polymer *PEDOT: PSS* with *poly (ethylene glycol) diacrylate (PEGDA)*, a photoactive cross-linker, highly employed for fabricating **photopatternable biomimetic interfaces**.

The idea here is that mixing a conductive polymer with a photoactive material could provide a final platform that not only has electrical properties, but can also be suitable for surface patterning. Indeed, thanks to the technique of photopatterning is possible to create defined 3D shapes at the surface of semiconductors by using an appropriate wavelength (able to stimulate the crosslinker). This 3D structures, widely studied in literature, are particularly attractive for cells and could also induce a preferential stretching along the patterned direction.

A comparison between two different deposition techniques: spin and spray coating was carried out to analyze smoother and rougher surfaces.

Also three different blends: Pristine *PEDOT: PSS, PEDOT: PSS / PEGDA (2%), PEDOT: PSS / PEGDA (8%) PEDOT: PSS / PEGDA (17%)* have been prepared to determine the effect of the presence of the cross-linker (PEGDA) on the conductivity.
An accurate electrical and topographical characterization has been carried out using different techniques: the morphology of the films was characterized via *scanning electron microscopy (*SEM) *atomic force microscopy (AFM)* and their electrochemical properties were investigated via *electrochemical impedance spectroscopy (EIS)*.
From all these analyses the *PEDOT: PSS / PEGDA (8%)* showed the best compromise between surface morphology and conductivity and so was selected as the best candidate to be tested as culture support for **primary fibroblasts**, showing high biocompatibility and cell spreading.
In conclusion, the paper reported a very easily processable material which, due to the optimal compromise between optical and electrical properties is achieved in the case of spray PEDOT: PSS electrode modified with 8% PEGDA, is suitable for bioelectronic applications.

If you liked this article and you want deepen the topic, you can find the original work, on ***Flexible and printed electronics***, here: https://iopscience.iop.org/article/10.1088/2058-8585/ab71e1