

PEDOT:PSS thin films for controlling cell growth

Marco Marzocchi

The use of conducting polymers as materials for bioelectronics is a rapidly-growing research field. Their mechanical and electrical properties, together with their excellent biocompatibility, make them more suitable than “traditional” inorganic semiconductors for being used as an interface between electronics and living cells. Moreover, the electronic properties of conducting polymers can be modified in response to electrical stimuli, creating the opportunity to use these materials as active substrates for cell growth. Among the many existing conducting polymers, poly(3,4-ethylene dioxythiophene) (PEDOT)-based materials, and especially its polystyrenesulfonate-doped form (PEDOT:PSS), have become reference materials for the interfacing of electronics and living tissues.

The cell-substrate interaction involves many different parameters, both physical (surface roughness, surface energy, electrical conductivity), chemical (pH, oxidation state) and biological (extra-cellular matrix formation, protein conformation), but the way these parameters are related to each other and to cell behavior is still not clear. Gaining a better understanding of the processes that control cell adhesion is crucial in order to use conducting polymers as a new tool in basic research, medical diagnostics, and tissue engineering.

In this seminar, I will present the results we obtained from physical and electrochemical characterization of PEDOT:PSS thin films, together with the outcome of cell growth experiments carried out on substrates prepared with different oxidation states.