NON-FOULING PEDOT FOR CONTROLLED CELL ADHESION

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Interfaces between materials and biological systems have always been the most critical aspects for the successful application of synthetic materials to *in vivo* medical applications, regardless whether the original material is designed for drug delivery, tissue engineering, implanted sensor devices or organs [1,2]. Approaches to improve biocompatibility of these materials include reduction of unspecific protein adsorption, enhancement of specific proteins adsorption and immobilizing of cell recognition moieties to obtain controlled interaction between cells and synthetic substrates. We have developed versatile nanobiointerfaces based on one of the most promising electrically conducting polymer, polyethylenedioxythiophene (PEDOT), through facile electropolymerization from aqueous microemulsion solutions containing various EDOT monomers. The fabricated PEDOT nanobiointerfaces have following characteristics: thin and smooth, composition-tunable with accessible surface functional groups, fast and selective deposition, amenable to large-scale manufacturing, conductive and low intrinsic cytotoxicity and no inflammatory response upon implantation. Through the proper design of side-chain functional group, adhesive (fouling) or non-adhesive (non-fouling) surfaces for controlled adhesion of proteins and cells were achieved. Our study shows that these PEDOT nanobiointerfaces are promising for applications of metabolite detection and cell patterning.

References:

[1] K. L. Prime, G. M. Whitesides, Science, **252** (1991) 1164-1167.
[2] R. G. Chapman, E. Ostuni, M. N. Liang, G. Meluleni, E. Kim, L. Yan, G. Pier, H. S. Warren, G. M. Whitesides, Langmuir, **17** (2001) 1225-1233.

Figures:

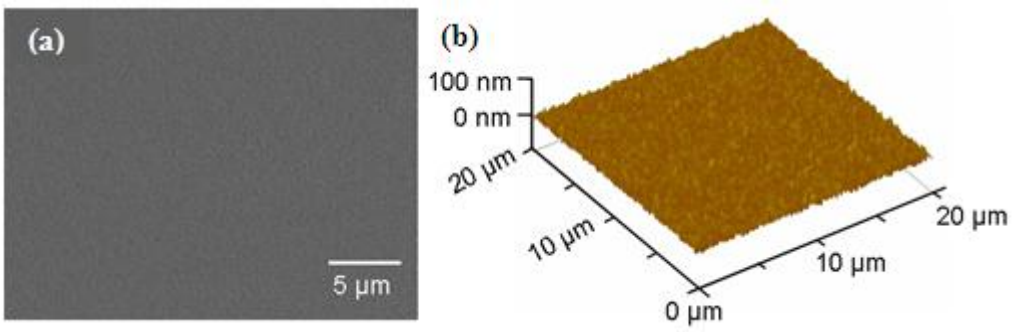

Figure 1: SEM (a) and AFM (b) image of poly(EDOT-COOH) films prepared from aqueous microemulsion.

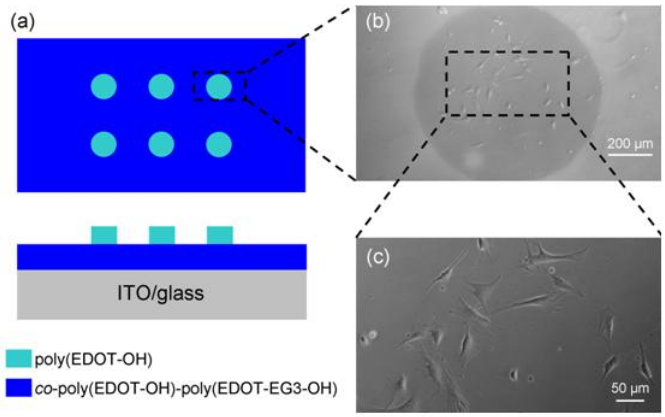

Figure 2: Controlled cell adhesion on patterned poly(EDOT-OH) on poly(EDOT-EG3-OH)-*co*-poly(EDOT-OH) surfaces. (a) Top and side views of the device patterned by selective electropolymerization using PDMS mask. Magnified microscopic images of selective cell adhesion on the patterned surface were shown in (b) and (c).