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ELECTRONIC BEHAVIOR OF ELECTROCHEMICALLY SYNTHESIZED POLYTHIOPHENE DERIVATIVES

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We have investigated the morphological and electronic characteristics of polythiophene derivatives, poly(3-methylthiophene), poly(3-hexylthiophene) and poly(3-octylthiophene), grown by electrochemical methods onto Au and tin-oxide substrates. Film thickness can be controlled by current density in the electropolymerization process. The film roughness depends on the thickness and on specific polythiophene derivative. The samples for electrical measurements were made in sandwich structure, metal/POT/metal (metal: Al, Au, Ni or TO) and from current-voltage data analysis estimate the positive charge carrier mobility and the potential barrier height in the metal/polymer interfaces.

The positive charge carrier mobility of the polythiophene derivatives grown by electrochemical methods, investigated in this work are:

Polymer	Mobility ($cm^2.V^{-1}.s^{-1}$)
poly(3-methylthiophene)	$(4.2 \pm 0.4) \times 10^{-4}$
poly(3-hexylthiophene)	$(9.4 \pm 3.0) \times 10^{-5}$
poly(3-octylthiophene)	$(5.1 \pm 1.2) \times 10^{-4}$