



# Thiophene and Pyrrole Derivative Polymers Electro-Synthesized on Stainles Steel. Doping and Morphology Characterization

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Résumé en anglais	3,4-ethylenedioxythiophene (EDOT), 3,4-propylenedioxythiophene (PRODOT), 3,4-ethylenedioxyppyrrrole (PEDOP) and 3,4 propylenedioxyppyrrrole (PRODOP), thiophene and pyrrole derivatives, were electro-polymerized by potentiodynamic and potentiostatic methods on stainless steel AISI 316 electrodes, using lithium perchlorate as support electrolyte in acetonitrile. In all cases electrodes modified with the respective polymeric deposit (PEDOT, PPRODOT, PPEDOP and PPRODOP) were obtained. One of the most relevant features of these polymers is that their voltammetric responses revealed that all presented p- and n-doping/undoping processes, being both processes reversible. Moreover, nucleation and growth mechanism (NGM) of the polymers was established by deconvolution of the experimental $j/t$ transients recorded during it electropolymerization. PEDOT and PPRODOP showed a single contribution to the overall process, corresponding to instant nucleation with three-dimensional growth, controlled by charge transfer, whereas pyrrole derivatives (PEDOP and PPRODOP) are controlled by the same contribution, but there is also a second one corresponding to progressive nucleation with diffusion-controlled three-dimensional growth. Nuclei shape predicted from these NGM is consistent with the respective morphologies determined by SEM and AFM that, once more, validated the proposed electropolymerization model and the morphology prediction from the NGM of the respective polymers. To sum up, a correlation between the structure of the starting unit, doping, and morphology of the electro-deposited polymers was established.
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