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Application to Molecular Electronics of Thin Layers of Organic Materials

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Abstract : In the research to replace silicon and other thin-film semiconductor technologies and to develop long-term technology that is environmentally friendly, low-cost, and abundant, there is growing interest today given to organic materials. Our objective is to prepare polymeric layers containing metal particles deposited on a surface of semiconductor material which can have better electrical properties and which could be applied in the fields of nanotechnology as an alternative to the existing processes involved in the design of electronic circuits. This work consists in the development of composite materials by complexation and electroreduction of copper in a film of poly (pyrrole benzoic acid). The deposition of the polymer film on a monocrystalline silicon substrate is made by electrochemical oxidation in an organic medium. The incorporation of copper particles into the polymer is achieved by dipping the electrode in a solution of copper sulphate to complex the cupric ions, followed by electroreduction in an aqueous solution to precipitate the copper. In order to prepare the monocrystalline silicon substrate as an electrode for electrodeposition, an in-depth study on its surface state was carried out using photoacoustic spectroscopy. An analysis of the optical properties using this technique on the effect of pickling using a chemical solution was carried out. Transmission-photoacoustic and impedance spectroscopic techniques give results in agreement with those of photoacoustic spectroscopy.

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