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Chitosan Films as Substrate to Line Patterning Technique of Graphite (LPTG). Application as Sensors.

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Flexible and disposable films are important features to develop substrates to Line Patterning Technique of graphite (LPTG), with potential application to electronic devices. With this work has been proposing the use of a chitosan an edible film to be a substrate of the technique. LP is a method that takes advantage of differing rates of reaction for a material with the printed line on a substrate and the naked substrate surface itself. The technique was originally created on the basis of conductive polymer aqueous dispersions being more readily adhesive to hydrophilic surfaces, such as overhead transparencies, rather than to hydrophobic surfaces, such as a toner line printed by a laser printer onto an overhead transparency poly(ethylene teraphtale). In this experiment we are proposing to use a biopolymer from chitosan film as substrate of LPTG. Chitosan is a natural polymer, biodegradable and non-toxic linear polymer, commercially available by the deacetylation of chitin, an abundant polysaccharide extracted from the shells of shrimps and crabs. Commercial-grade chitosan and aqueous acetic acid solution (1%) were used to prepare chitosan and alkyl-chitosan derivative precursor solutions. Films were then prepared by solution casted onto acrylic an Petri dishes at room temperature. After drying the films were peeled from the dishes. The LPTG process consists in printing the mask on a conventional Laser printer. To make a conductive patterning on to a chitosan film it is necessary to dip it into the graphite dispersion for 1-2 seconds at room temperature. The aqueous dispersion of graphite (1:4 (weigth/weigth)) was used. After that it was then dipped into a toluene bath (eg. 200 mL toluene) at room temperature and ultrasonicated for 1 minute, leaving only the graphite on the film. A interdigitated electrode with four fingers in each side of the device was developed. The morphology of the chitosan film was studied with the atomic force microscopy (AFM). Images and roughness (RMS) were taken, using a Topometrix Discoverer TMX 2010 in standard contact mode. The influence of the organic vapor (methanol) in the variation of the electric response (Ω) was confirmed using a commercial multimeter. The RMS roughness of the sample, with area image of 400 μm2, 100 μm2, 25 μm2 and 1.0 μm2 were respectively 44.62nm, 18.99nm, 10.27nm and