

SURFACE NANOSTRUCTURATION TO INCREASE POLYPYRROLE ADHESION DEPOSITED BY PECVD

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Conducting polymers are gaining increasing attention for micro and nanoelectronic applications[1]. One of the most important efforts is being focused on the developing of gas sensors. In comparison with other materials, conducting polymer can offer a higher sensitivity, a shorter response time or a lower cost fabrication. However, sometimes these polymers present a lack of adhesion with the substrate. Thus, to prevent this unwanted effect is necessary to modify the surface. The use of self-assembled monolayers (SAMs) has become a very common technique to nanostructure surfaces. Choosing a proper terminated group of the monolayer can lead to the design of the surface with the properties required in each work. For instance, Willicut[2] et al reported that a pyrrole-terminated group enhances the deposition and growing of polypyrrole by electrochemical synthesis. According to this, previous investigations in our research group have demonstrated that the same effect can be observed in the deposition of polypyrrole by plasma enhanced chemical vapor deposition (PECVD)[3]. PECVD is a solventless technique through which the desired material layer can be achieved from the vapor phase. In addition, this technique allows an absolute control in the deposition rate to obtain very thin films. Regarding earlier work, the effect of alkanethiols monolayers assembled on a gold surface have been widely studied. Nevertheless, the use of copper in microelectronics for the fabrication of almost any electronic device makes necessary a deeper study in this kind of surface. Moreover, not only a thiol group can be assembled on copper, but a selenol group can become an alternative for this purpose[4]. In this work we describe and compare the employ of ω -(pyrrolyl)alkanethiol and selenol molecules with different chain length to modify a copper substrate. The quality and the ordering of the monolayer have been studied by XPS and electrochemical experiments. Further plasma polymerization has been carried out on the different modified substrates to study the deposition-growth mechanism, adhesion and electrical properties of these films.

References:

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Figures:

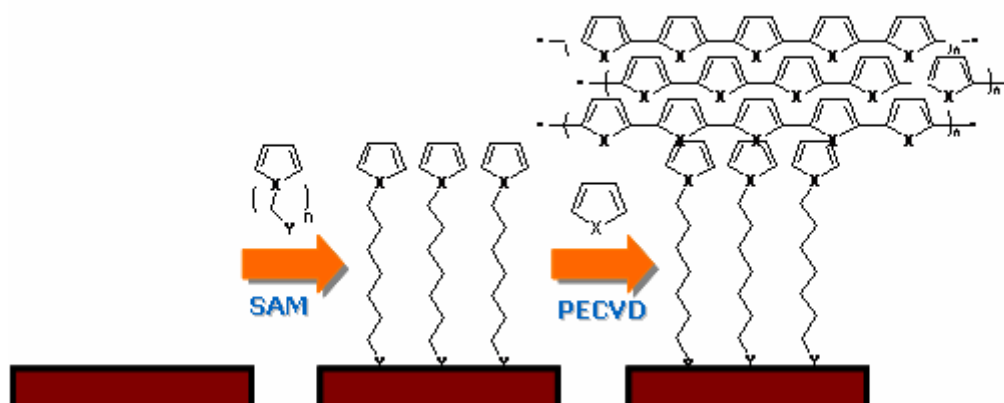


Figure 1. Scheme of the surface modification using self-assembly and the posterior plasma polymerization.