PLASMA POLYMERIZATIONS PROCESS - RECENT ADVANCES IN POLYMER THIN FILMS

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In literature a vast amount of researches on plasma polymerization can be found. The main reason for applying plasma polymerization is that thin, stable, and pinhole-free films are obtained, which show good adherence to many substrates, but with poor predictability of the chemical structure, high degree of cross-linkage and very high electrical resistivity of the resulting plasma polymerized layer [1-3].
Obtaining of conjugate oligomer/polymer as thin films with low degree of cross-linkage and semiconducting properties deposited by plasma polymerization represents a challenge. I have developed a plasma-polymerization instrument using a direct current (d.c.) glow discharge capable of using liquid monomers and solid-liquid combinations as the starting materials. In this paper several combinations of *p*-xylene monomer with isolated rings (biphenyl - PPD-B and quarterphenyl - PPD-Q) and condensed rings (anthracene - PPD-A and naphthalene - PPD-N) aromatic polycyclic precursors have been plasma polymerized with the objective to obtain polymer films with specific properties related to organic electronic applications.
The characteristics of films prepared by d.c. glow discharge were examined by FT-IR, AFM, SEM, TEM, HRTEM, SAED, XRD. The structures of the deposited plasma polymer films were greatly influenced by the applied d.c. voltages during the discharge. Also, formation process of the plasma thin films depending on the precursor systems. The current–voltage characteristics in asymmetric electrode configuration were studied for determining the conduction mechanism. It was found that the conduction mechanism controlled by SCLC is dominant in plasma polymerized thin films.

References:

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