Physical and Chemical Properties of Thin Films Obtained by Plasma Polymerisation in a Dielectric Barrier Discharge

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The presented work deals with plasma polymer films obtained from both gaseous and liquid organic precursors at atmospheric pressure under various process conditions. A detailed study of organic plasma polymer films was carried out to determine chemical composition, structure and surface morphology. The physical properties of the plasma polymer films were characterised by field emission scanning electron microscopy (FESEM) and contact angle measurements. Chemical properties were characterised by attenuated total reflection Fourier transform infrared spectroscopy (ATR-FTIR), nuclear magnetic resonance (NMR) and electron paramagnetic resonance (EPR). In this way the retention of the structure of the initial monomer in the plasma polymer obtained was evaluated. Varying degrees of cross-linking were observed using different carrier gases and discharge characteristics. As a consequence, the properties of plasma polymer films can differ significantly from their classic chemical counterparts.