

**PLASMA FUNCTIONALISED POLYMER FILMS AND BEADS FOR
IMMOBILIZATION OF BIO-MOLECULES**

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Cold plasma processing of polymeric materials, notably powder, in order to graft convenient chemical moieties has a very large range of applications especially in the field of biotechnology.

In this paper different reactors set up for the plasma processing of polymer films as well as beads will be presented. Different materials such as polyethylene, nitrocellulose and PVDF membranes were treated under a low-pressure plasma using a reactor with non symmetrical configuration of electrodes. As for the surface treatment of polymer beads a fluidized bed, low pressure capacitively coupled 13.56 MHz plasma was used. The transit time of the LDPE powders in the fluidized bed during the fluidization has been calculated by Anemometry Laser Doppler (ALD) technique which is a non intrusive method allowing to have a direct measurement of the velocity of the polymer beads or powders in the fluidized bed. Furthermore OES was performed to characterize the energetic character of the discharge and MS was performed to identify the neutral stable species produced in the discharge.

Different plasma gases such as ammonia, nitrogen, mixtures of ammonia and hydrogen as well as CO₂ were used in order to modify the surface properties of the polymers. Surface characterization techniques such as contact angle measurements, XPS, SEM as well as quantitative derivatization methods which have been developed for the rapid determination of the amount of amino or carboxylic groups directly grafted on plasma treated powders and films were used. Different application of such plasma treated polymeric materials will be presented such as 1) to confer bactericide properties by incorporating nitrogen-containing species and more particularly quaternary ammonium on the surface of the materials in the field of ophthalmic ocular and intraocular lenses. 2) to immobilize antibodies by a covalent bonding on the functionalized support for membrane based enzyme immunoassay and affinity chromatography applications.