

PLASMAS AND POLYMERS: FROM LABORATORY TO LARGE SCALE COMMERCIALIZATION

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ABSTRACT

The use of low-pressure glow discharge plasma for industrial manufacturing operations was first introduced by the semiconductor industry in the late 1960s. Since the mid-1980s, many other sectors, particularly those which make extensive use of plastics and polymer-based composites (for example, the automotive, aerospace, packaging, pharmaceutical, and consumer products industries) have recognized the many advantages offered by plasma-aided manufacturing techniques.

In this paper we describe how low-pressure plasma processes have progressed from the stage of curiosity-driven research in a particular university laboratory to pilot-scale development which can be transferred to industry. We explain how this research can benefit a particular industrial organisation which has specialised in low-pressure plasma processing of materials ("Nanoscience on Surfaces").

In all the cases illustrated, we deal with polymeric substrate materials, either in the form of powders, discrete parts, or flexible films: Two generic process types are described in some detail, namely surface modification and plasma deposition. Specific attention is given to dual-frequency plasma-assisted CVD (PACVD) coating of glassy barrier layers on flexible packaging materials, a process which is now ready for the marketplace.

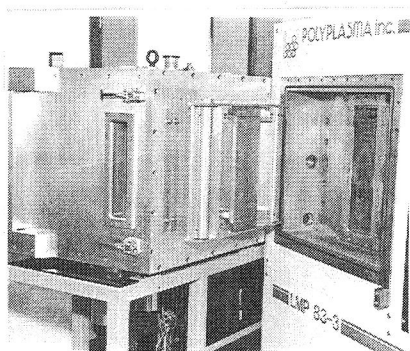


Fig.1 Pilot scale laboratory PACVD
roll coater for 30 cm wide webs.

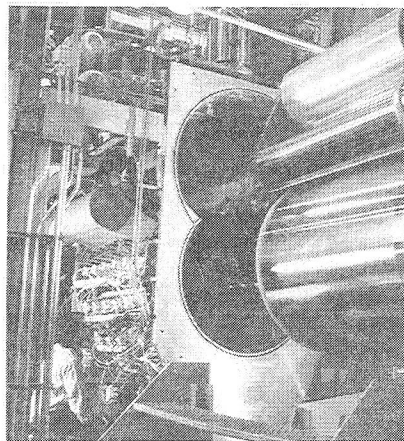


Fig.2 100 cm industrial PACVD
roll coater.