〔J. Chem. Soc., Faraday Trans. 1, **82**, 1441 (1986)〕

Physicochemical Properties of a Plasma-exposed Glass Surface in a Closed System.

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Physicochemical properties of a plasma-exposed glass surface under plasma conditions similar to those in plasma-initiated polymerization (brief plasma generation in a closed system) were investigated by SEM, X. p. s., wettability and electric conductivity measurements in order to elucidate how long-lived organic radicals can be trapped on such a glass surface. It was found that an invisible ultrathin polymer film was deposited on such a glass surface in the case of organic plasma exposure even under the above plasma conditions. It has been suggested that the film can serve as an efficient host matrix for a variety of organic radicals which can be released under appropriate conditions so as to initiate the polymerization of various vinyl monomers.

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Mechanism of Plasma-Initiated Polymerization: Concerning the Nature of Solvent Effects on the Lifelike Polymerization of Water-Soluble Vinyl Monomers.

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To provide a satisfactory basic understanding of the solvent effect of plasma-initiated polymerizations, we have carried out polymerizations of various water-soluble vinyl monomers. It has been shown that aqueous solution of such vinyl monomers underwent the polymerizations induced by methyl isobutyrate (MIB) plasma-exposed glass surface. The efficiency, however, was largely dependent on the solvent used : the solvent can be considered to act as "an initiation-activator" for the polymerization. Thus it has been suggested that the choice of good-balanced combination between the structural feature of ultrathin film and the solvent is important to achieve activity of a desired solution polymerization.

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Alternative Mechanism for "Plasma Reduction".

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We report the evidence that a nitrogen-derived basic moiety is readily leached out of a novel ultrathin film, formed by a brief plasmolysis of various nitrogen-containing organic vapors, into either polar or nonpolar solvents. Thus, "plasma reduction" of various types of compounds, including non-electron-accepting ones, reportedly claimed by plasma electrons can also be rationalized in terms of base-catalyzed reactions with nitrogen-derived basic ultrathin films.