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Analysis of Diglyme Plasmas under Low Pressure Low Temperature Conditions by Mass Spectrometry

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Mass spectrometry is an important technique to investigate vacuum and discharges maintained in low or high pressure. Mass spectrometry has been used to investigate discharges from organic compounds, due to them being precursors of organic solid materials used in several technological applications. In this work the mass spectrometry technique was used to investigate the fragmentation process of diethylene glycol dimethyl ether (CH3O(CH2CH2O)2CH3) (diglyme here in) molecule in low pressure RF excited plasma discharges. The study was carried out using mass spectrometry. The results showed that for a fixed pressure, the increase of the RF power coupled to the plasma chamber from 1 to 35 W produced a plasma environment much more reactive which increases the population of the ionized species like CH_3^+ (15 amu), $C_2H_4^+$ (28 amu), CH_3O^+ (31 amu), $C_2H_4O^+$ (44 amu), $CH_3OCH_2CH_2^+$ (59 amu) and $CH_3OCH_2CH_2O^+$ (75 amu). This fact may be attributed to the increase of the electronic temperature that makes predominant the occurrence of inelastic processes that promotes molecular fragmentation. For a fixed value of RF power the increase of pressure from 10 Pa to 30 Pa produces the decreasing of the above mentioned chemical species due the lower electronic mean free path. These results suggest that if one wants to keep the monomer's functionality within the plasma deposited films resulting from such kind of discharges one must operate in low power conditions.

Keywords
Plasma
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