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Study of biocompatibility of Plasma Polymerized Diethylene Glycol Dimethyl Ether Films

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This paper deals with the study of biocompatibility of plasma polymerized (CH3OCH2CH2)2O diethylene glycol dimethyl ether (PP-diglyme here in) deposited by RF excited low pressure plasma discharges. The study was carried out using mass spectrometry and goniometry. The mass spectra were collected by a mass spectrometer, from Hiden Analytical, operating in the mass range from 1 to 300 amu. Plasmas were generated within a stainless steel cylindrical reactor in a plane parallel plate configuration. The 13.56 MHz RF power was coupled to the chamber through an appropriate matching network. Mass spectrometry allowed one to follow the trends of several chemical species resulted from diglyme's molecule fragmentation for different values of pressure and RF power aiming the customization of PP-diglyme biocompatibility. The results showed that for a fixed pressure, the increase of the RF power coupled to the plasma chamber from 5 to 45 W produced a plasma environment much more reactive which reduces the population of the heavier species and increases the population of the lighter one. This fact may be attributed to the increase of the electronic temperature that makes predominant the occurrence of inelastic processes that promotes molecular fragmentation. The contact angle measurements of PP-diglyme deposited over PMMA substrates were carried out using a ramé-hart and a home-made goniometers. The results showed that PP-diglyme obtained from discharges generated at lower RF power levels caused a pronounced decreasing in contact angle from 75° to 25° soon after the deposition. These results suggest that if one wants to keep the monomer's functionality and therefore the PPMA biocompatibility resulting from PP-diglyme deposition one may operate at low RF power level.

Keywords
Diglyme
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