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Ion Flux Assisted PECVD of SiON Films Using Plasma Parameters and Their Characterization of High Rate Deposition and Barrier Properties

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Silicon oxynitride (SiON) was deposited for gas barrier film on polyethylene terephthalate (PET) using octamethylycyclodisiloxane (Si4O4C8H24, OMCTS) precursor by plasma enhanced chemical vapor deposition (PECVD) at low temperature. The ion flux and substrate temperature were measured by oscilloscope and thermometer. The chemical bonding structure and barrier property of films were characterized by Fourier transform infrared (FT-IR) spectroscopy and the water vapor transmission rate (WVTR), respectively. The deposition rate of films increases with RF bias and nitrogen dilution due to increase of dissociated precursor and nitrogen ion incident to the substrate. In addition, we confirmed that the increase of nitrogen dilution and RF bias reduced WVTR of films. Because, on the basis of FT-IR analysis, the increase of the nitrogen gas flow rate and RF bias caused the increase of the C=N stretching vibration resulting in the decrease of macro and nano defects.

Keywords: WVTR, low temperature, plasma process, chemical structure