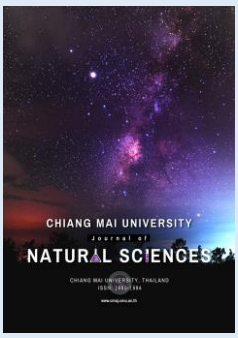

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Research article

Analysis of Optical Emission Spectra during Nitrogen-Plasma Treatment to Control the Wettability of Polystyrene Surface

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Abstract In this work, we apply optical emission spectroscopy to investigate active plasma species to study that plasma nitrogen treatment affects polystyrene surfaces. Data concerning these active plasma species are crucial for exploring the polystyrene layer's functionality deposited on quartz crystal microbalance (QCM) surface. Wettability function in biosensors development is essential aspects for biomolecule immobilization. The surface of the polystyrene layer was modified by plasma nitrogen treatment. The process parameters affecting plasma species and characteristic, and hence the treatment results studied in this work were chamber pressure, flow rate, and DC bias. The plasma analysis was conducted by optical emission spectroscopy. The spectroscopy was utilized to predict the active species of plasma, the electron temperature Te and the electron density Ne. The dominant reactive species was N^{2+} which go through different plasma interactions and on the polystyrene surface depending on the DC bias voltage, the nitrogen-gas flow rate, and the chamber pressure. The plasma treatment results suggest that the ion bombardment was the dominant mechanism that changes the polystyrene's surface. The plasma behavior and surface interactions were found complex with the variation of the process parameter.

Keywords: Electron density, Electron temperature, OES, Nitrogen-plasma treatment, Wettability

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