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Effects of OH Radical Density from Atmospheric Plasma to Induce Cell Death in Lung Cancer and Normal Cells

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Atmospheric plasma's electron temperature is less than thermal plasma, so it is useful at bio experiment. We have investigated the optical emission spectroscopy (OES) lines by spectrometer during Atmospheric plasma bombardment onto the PBS surface by using an Ar gas flow. Also we have measured the OH radical density inside the solution induced by the Atmospheric plasma bombardment. OH radical species are appeared at 308 nm and 309 nm. Densities of OH radical species has been found to be significantly decreased versus depth of the solution from 2 mm to 6 mm. OH radical density inside the PBS is measured to be about 1.87×1016 cm-3 downstream at 2 mm from the surface under optimized Ar gas flow of 200 sccm in Atmospheric plasma. Also we have investigated cell viability of lung cancer and normal cell after Atmospheric plasma treatment for fixed exposure time in 60 seconds, but different depths. We used SEM, we observed change of cell morphorogy, did experiment about FDA & PI Staining method. It is found that there is selectivity between the lung cancer and lung normal cell, in which cancer cell definitely has higher cell death ratio more than normal cell. We have investigated change of bond structure in FT-IR spectroscopy, the following peaks were observed: and intense O-H peak at 3422 cm-1 and at 2925 cm-1 corresponds to C-H stretch vibrations of methylene group.

Keywords: Densities of OH radical species, optical emission spectroscopy, lung cancer and normal cell

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Increasing P/E Speed and Memory Window by Using Si-rich SiOx for Charge Storage Layer to Apply for Non-volatile Memory Devices

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The Transmission Fourier Transform Infrared spectroscopy (FTIR) of SiOx charge storage layer with the richest silicon content showed an assignment at peaks around 2000～2300 cm-1. It indicated that the existence of many silicon phases and defect sources in the matrix of the SiOx films. The total hysteresis width is the sum of the flat band voltage shift (ΔVFB) due to electron and hole charging. At the range voltage sweep of ±15 V, the ΔVFB values increase of 0.57 V, 1.71 V, and 13.56 V with 1/2, 2/1, and 6/1 samples, respectively. When we increase the gas ratio of SiH4/N2O, a lot of defects appeared in charge storage layer, more electrons and holes are charged and the memory window also increases. The best retention are obtained at sample with the ratio SiH4/N2O=6/1 with 82.31% (3.49V) after 103s and 70.75% after 10 years. The high charge storage in 6/1 device could arise from the large amount of silicon phases and defect sources in the storage material with SiOx material. Therefore, in the programming/erasing (P/E) process, the Si-rich SiOx charge-trapping layer with SiH4/N2O gas flow ratio=6/1 easily grasps electrons and holds them, and hence, increases the P/E speed and the memory window. This is very useful for a trapping layer, especially in the low-voltage operation of non-volatile memory devices.

Keywords: Memory, speed, Programming, Erasing