

PT-P029

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 $1.87 \times 10^{16} \text{ cm}^{-3}$ 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 morphology, 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

PT-P030

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

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The Transmission Fourier Transform Infrared spectroscopy (FTIR) of SiO_x charge storage layer with the richest silicon content showed an assignment at peaks around $2000 \sim 2300 \text{ cm}^{-1}$. It indicated that the existence of many silicon phases and defect sources in the matrix of the SiO_x films. The total hysteresis width is the sum of the flat band voltage shift (ΔV_{FB}) due to electron and hole charging. At the range voltage sweep of $\pm 15 \text{ V}$, the ΔV_{FB} 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 SiO_x material. Therefore, in the programming/erasing (P/E) process, the Si-rich SiO_x 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