

The fabrication of biosensor using the defected Carbon Nanotubes (CNTs) by e-beam irradiation

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E-beam has been used in various applications such as sterilization of fruits, lithography in semiconductor process and coloring of jewelry. We demonstrate the control of deformation on the surface of carbon nanotubes by the controlled e-beam irradiation. E-beam was irradiated onto the surface of CNTs at several kGy at 1.3 MeV. Using yeast, we confirmed that the film of CNTs can be used as a sensitive biosensor. Yeast is a kind of representative fungi and consists of protein over 50% and various inorganic. TEM image shows the defects on the surface of CNTs. Raman spectroscopy revealed the presence of defects and the adsorption of yeast on the CNT surface. Raman spectrum show that the ratio (I_G/I_D) was increased due to e-beam irradiation and decreased by adsorption of yeast. The final confirmation about the efficiency of biosensor has been carried out using CNT film electrode via probe station. The conductance of CNT was increased according to the amount of e-beam irradiation. The deposition of yeast on CNT film electrode showed the decrease of conductance. Our conclusion is that the characteristics on CNT surfaces can be controlled by e-beam irradiation and these CNTs can be utilized as a biosensor.