

Measurement of Secondary Electron Emission Coefficient and Bimolecular Valence Band Energy Structure of Erythrocyte with and Without Bioplasma Treatment

Jin Young Lee, Guyon Baik, Eun Ha Choi*

광운대학교 전자물리학과 대전입자빔 및 플라즈마 연구실

Recently, nonthermal bioplasma has been attracted by researchers due to their potentials to modulate cellular functions resulting in changes of biomolecular electron band structures as well as cell morphologies. We have investigated the secondary electron emission characteristics from the surface of the erythrocyte, i.e., red blood cell (RBC) with and without the nonthermal bioplasma treatment in morphological and biomolecular aspects. The morphologies have been controlled by osmotic pressure and biomolecular structures were changed by well known reactive oxygen species. Ion-induced secondary electron emission coefficient have been measured by using gamma-focused ion beam (γ -FIB) system, based on the quantum mechanical Auger neutralization theory. Our result suggests that the nonthermal bioplasma treatment on biological cells could result in change of the secondary electron emission coefficient characterizing the biomolecular valence band electron energy structures caused by the cell morphologies as well as its surface charge distributions.

Keywords: Erythrocyte, Nonthermal bioplasma, Gamma-focused ion beam