

Abstract Submitted
for the GEC16 Meeting of
The American Physical Society

Membrane Deformation and Permeabilization Caused by Microplasma Irradiation¹ HIDEKI MOTOMURA, HIDENORI NAGAIWA, KENTA YAMAMOTO, Ehime University, YUGO KIDO, Pearl Kogyo Co., Ltd., YOSHIHISA IKEDA, Ehime University, SUSUMU SATOH, Y's Corp., MASA-FUMI JINNO, Ehime University — The microplasma irradiation achieves high gene transfection efficiency and high cell survivability simultaneously. For this purpose, we have developed a special plasma source using a microcapillary electrode. However, it is not clear how the stimuli of effective factors generated by plasma, such as current, charge, field, chemical species, cause transfection. In this study, we used artificial cell which is a spherical vesicle consisting of a lipid bilayer to visualize membrane dynamics and permeabilization caused by microplasma irradiation. Dioleoyl phosphatidylcholine (DOPC) was used as phospholipid molecules forming the lipid bilayer. The artificial cells were prepared by natural swelling method. Fluorescent labeled polyethylene glycol (PEG) polymers (Nanocs, MPEG Fluorescein, MW = 1000) were encapsulated in the artificial cells. The artificial cells were exposed to the microplasma for 5 ms and 10–20% of decrease of the dye fluorescence in the artificial cells was observed. This result suggests the outflow of the MPEG polymers through temporary poration or deformation of the lipid bilayer. The membrane deformation dynamics was directly observed with a microscope and the relationship to the polymer outflow will be shown at the conference.

¹This work was partly supported by a Grant-in-Aid (25108509 and 15H00896) from JSPS and a grant from Ehime University.

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Date submitted: 10 Jun 2016

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