

Abstract Submitted
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Spatially-Selective Membrane Permeabilization Induced by Cell-Solution Electrode Atmospheric Pressure Plasma Irradiation SHOTA SASAKI, YUTARO HOKARI, Department of Electronic Engineering, Tohoku University, MAKOTO KANZAKI, Department of Biomedical Engineering, Tohoku University, TOSHIRO KANEKO, Department of Electronic Engineering, Tohoku University — Gene transfection, which is the process of deliberately introducing nucleic acids into cells, is expected to play an important role in medical treatment because the process is necessary for gene therapy and creation of induced pluripotent stem (iPS) cells. However, the conventional transfection methods have some problems, so we focus attention on promising transfection methods by atmospheric pressure plasma (APP). We have previously reported that the cell membrane permeability, which is closely related with gene transfection, is improved using a cell-solution electrode for generating He-APP [1, 2]. He-APP is irradiated to the solution containing the adherent cells and delivery materials such as fluorescent dyes (YOYO-1) and plasmid DNA (GFP). In case of YOYO-1 delivery, more than 80% of cells can be transferred only in the plasma-irradiated area and the spatially-selective membrane permeabilization is realized by the plasma irradiation. In addition, it is confirmed that plasmid DNA is transfected and the GFP genes are expressed using same APP irradiation system with no obvious cellular damage.

- [1] S. Sasaki, M. Kanzaki, and T. Kaneko, *Appl. Phys. Express* 7 (2014) 026202.
- [2] T. Kaneko, S. Sasaki, Y. Hokari, S. Horiuchi, R. Honda, and M. Kanzaki, *Biointerphases* 10 (2015) 029251.

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