A novel technology of cell immobilization based on sialic acid engineering

Hee Young Shin[1], Eun Jeong Kim[1], Sangyong Jon[2], Kevin J Yarema[3], Kyuwon Kim[4]

[1]*Division of Metrology for Quality Life, Korea Research Institute of Standards and Science, Daejeon, 305-600, Korea*

[2]*Department of Life Science, Gwangju Institute of Science and Technology, Gwangju, 500-712, Korea*

[3]*Department of Biomedical Engineering, The Johns Hopkins University, Maryland 2121, USA*

[4]*Division of Chemistry and Biology, University of Incheon, Incheon, 402-749, Korea*

E-mail: ejkim@kriss.re.kr, Tel: 82-42-868-5790, Fax: 82-42-868-5801

Metabolic substrate-based sialic acid engineering techniques, where exogenously supplied *N*-acetylmannosamine (ManNAc) analogues are utilized by the sialic acid biosynthetic pathway, allow the cell surface to be endowed with novel physical and chemical properties. Among the ManNAc analogues, it has been reported that Ac_5ManNTGc enables thiols to be expressed in surface sialic acids. Herein we introduce the cells expressing this versatile functional group (-SH) into the immobilization to a solid substrate. Immobilization has been recognized as an essential element technology of cell-based microchip device manufacturing. Jurkat (human T lymphoma) cells which were supplied with the Ac_5ManNTGc expressed the thiols on their surface and we observed that cells were clustered with themselves above time. Cell surface thiols were evaluated by labeling with maleimide-biotin followed by avidin-conjugated quantum dot staining. We prepared the electrochemically active polymer thin film containing hydroquinone moiety. Cells were immobilized to the polymer thin film via electrochemical oxidation of hydroquinone moiety. These results can be expected to contribute the site-selective nano/micro immobilization technology of biomolecules including cells.