

Electro-triggered, quantitative single-cell transfection using ultrathin nanoinjector

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We developed single-cell system for electro-triggered, quantitative transfection. This system is based on the use of an ultrathin Au nanowire (NW) injector that has the thinnest diameter among the DNA delivering devices as well as optimum mechanical properties. Well-defined single-crystalline Au surface and high electric conductivity of ultrathin injector allow precisely timed and efficient electrochemical release of DNA molecules attached on a Au NW surface while minimizing cell damage. Using this system, we successfully delivered and both linear DNA and plasmid DNA in a single cell nucleus. This system would find important biomedical applications in the fields such as gene therapy, DNA vaccination, targeted drug delivery, and probe/control of cell signaling events. [This work was supported by the Technology Development Program to Solve Climate Changes on Systems Metabolic Engineering for Biorefineries (NRF-2012-C1AAA001-2012M1A2A2026556) of the Ministry of Education, Science and Technology (MEST) through the National Research Foundation of Korea.]

Reference

1. Yoo, S.M. et al., Nano Lett. (2013), 13 (6), 2431-2435.