Gold nanowire nanoinjector for delivering gene into cell nucleus

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Delivery of bioactive materials into a cell is highly important in the study of cell biology and medical treatments. Ideal nanoinjectors should be able to deliver biomaterials with high spatial resolution while causing minimum cell damage. We developed a Au nanowire (NW) nanoinjector that has the thinnest diameter among the DNA delivering devices as well as optimum mechanical properties, minimizing cell damage. Well-defined single-crystalline Au surface and high electric conductivity of a Au NW nanoinjector allow precisely timed and efficient electrochemical release of DNA molecules attached on a Au NW surface. Both linear DNA and plasmid DNA were delivered separately, and showed successful expression. The Au NW nanoinjector would find important biomedical applications in the various fields. [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.]