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Femtosecond laser-assisted delivery of molecules into single living cells CHENG PENG, INGRID WILKE, ROBERT PALAZZO, Rensselaer Polytechnic Institute — The controlled delivery of membrane impermeable molecules into single living cells (micro-injection) is important for a variety of applications such genomics, proteomics or drug screening and testing. Recently, it has been demonstrated that opto-injection with femtosecond (fs) laser pulses at near-infrared (nir) wavelengths (700-1100nm) has the potential to create transient pores in single living cells with high cell survival rates and transfection efficiency. However, the physical mechanisms of fs nir opto-injection is poorly understood. Here, we present an experimental study of fs nir laser-assisted opto–injection of Bovine Aorthic Endothelial Cells (BAEC). Transient pore creation is studied experimentally by fluorescent dye uptake. Using this experimental approach we have investigated individual BAE cells for laser power levels up to 400mW. We found that the minimum laser power density for pore creation is 2.5×10^6W/mm^2.We observe that fs nir opto-injection is a stable and reliable method of micro-injection and that pore creation is transient. For power levels between 50mW and 150mW we observe 100% cell survival as judged by the unaltered cell morphology.

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