

Permeabilizing Millions of Cells with Single Pulses of an Excimer Laser

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Abstract

Poration of millions of cells with single laser pulses of an Argon Fluoride excimer laser is developed and demonstrated on plant cells. The essence of the technique is to use the large beam size (10 x 25 mm) of the excimer laser and to split it using an appropriate contact mask into millions of micron- or submicron-sized beams of 193 nm radiation with enough energy to perforate cell membranes and walls. The extremely small depth of penetration of the 193 nm radiation in biological tissue (<1µm) is used to great advantage in this technique to provide for a gentle method that does not lead to cell death. This is the first laser-based method that has enough throughput to make it viable for biotechnological applications.

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