

LASER CUTTING OF YEAST MITOTIC SPINDLES BY A PICOSECOND DIODE LASER

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Laser cutting experiments have led to important discoveries in cell biology [1]. With this technique, it is possible to ablate specific structures inside a cell locally and with rapid time resolution. Previously, a femtosecond pulsed laser at 880 nm [2], as well as a nanosecond pulsed laser at 532 nm [3] have been used for mitotic spindle cutting experiments. Here we use a low-cost and easy to use picosecond pulsed 405 nm laser diode to dissect unlabeled and GFP-labeled spindle microtubules in the fission yeast *Schizosaccharomyces pombe*. Laser irradiation at short exposure times induced spindle photo-bleaching, whereas longer exposures resulted in partial or complete cutting of the spindle. The photo-bleached and partially cut spindles typically continued elongating. The completely cut spindles broke into two segments, which later reconnected to form a functional elongating spindle in ~50% of cases. Cell division proceeded normally in most irradiated cells, though the separation of the daughter cells was delayed in comparison with non-irradiated cells. We conclude that a picosecond pulsed laser diode can be used for precise ablation of intracellular structures in the smallest and most genetically tractable model system for eukaryotic cell division.

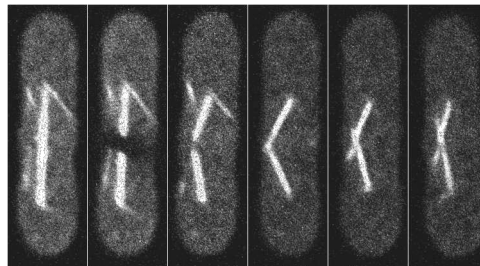


Figure 1: Laser ablation of the mitotic spindle.

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