Photodisruption in tubid tissues with ultrashort laser pulses

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- General method
- Dynamics of photodisruption
- **Results and discusion Precise** incision Subsurface Microstructure **Microfilaments**





Applications



Photodisruption: removal of tissue by ablation or vaporization

focus ultrashort pulse on tissue

high laser intensity at focus

ionization by nonlinear mechanisms (MPI, tunnneling, avalanche)

microscopic damage

Introduction









100fs, $20\mu J$, single pulse





100fs, 30µJ

100fs, 4μ**J**



200ps, 10µJ

200ps, 5µJ

200ps, 3µJ



fs pulse ps pulse subsurface damage at 20μJ

surface damage at 40μJ

fs pulse

ps pulse



Filament



100fs, 3µJ, 0.6NA

Filament



100fs, 30µJ, 100 pulses



100fs, 3µJ, 3000 pulses



100fs, 20µJ, 100 pulses



100fs, 3µJ, 3000 pulses



high intensity laser pulses



Self-fucusing leeds to ionization of the medium

Plasma defocusing balances self-focusing







Precise incision



Precise incision



Precise incision

100fs, 20µJ





3 passes at 0, 100 μ m, and 200 μ m

Applications



Dermitology: tatoo removal

Biology: cell mipulation



High precision scalpal

Tansdermal drug delivery



demonstrated subsurface cavity formation in animal skin tissue

demonstrated precise m-wide incision in bulk skin using fs pulses

advantages of fs pulses versus ps pulses reduced collateral damage smaller spot size in bulk

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For a copy of this talk and additional information, please see:

http://mazur-www.harvard.edu