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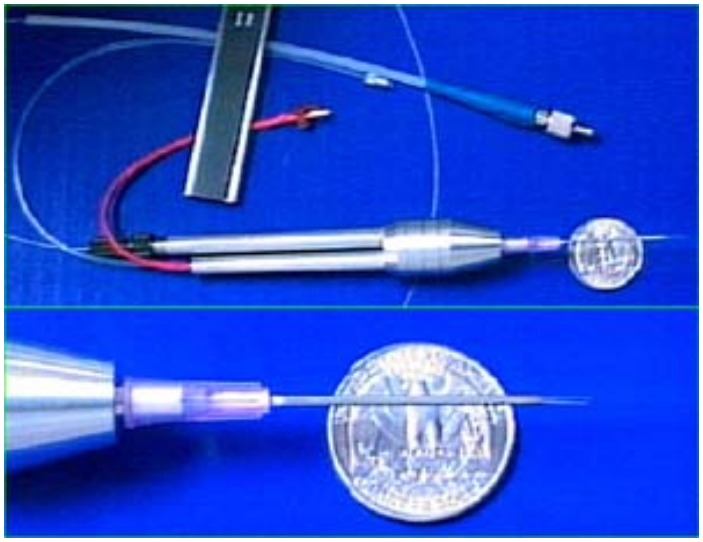
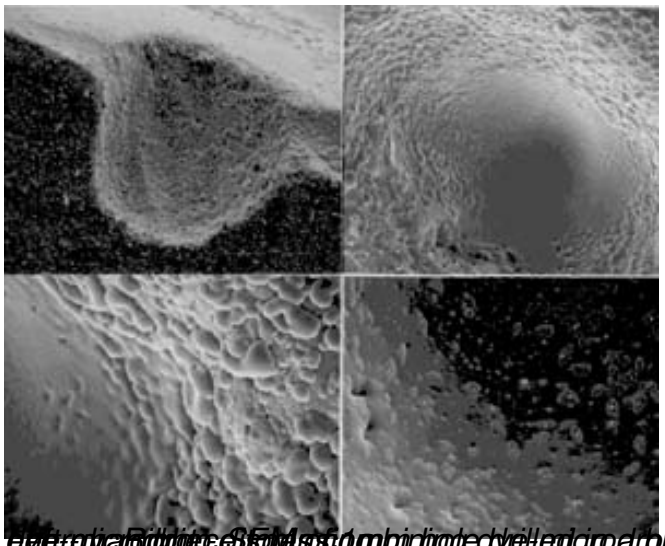
Overview of laser ablation

Laser energy has been used in manufacturing for sheet metal cutting or machining holes. The laser energy is used to melt-sublimate the material to be removed. To prevent overheating the laser pulses have a very short duration. Laser ablation can be used for removal of biological materials like bone and teeth tissues. Under this applications overheating becomes more critical as the tissue should not reach temperatures that could produce permanent damage.

Laser ablation procedures

MicroFab is developing applications from its patented process of combining ink-jet fluid microdispensing of optically absorbent materials (usually dyes or pigments) with laser energy applied to tissue. The ability to place nanoliter scale volumes of dye as a energy absorber at rates as fast as a laser can be pulsed (20+ per second) makes the ablation process independent of the tissue energy absorption characteristics. Specific applications include laser surgical and dental procedures that involve tissues that are not well suited to laser methods because of poor optical energy absorption. A dye assisted ablation movie illustrates the increase in efficiency that results from combining the dye deposition and the laser pulses.

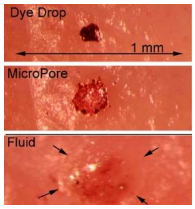




[illegible] SEM [illegible] dye-microdrop [illegible] using a low power laser assisted laser [illegible]

Other applications

These same tools can be viewed as general exogenous fluid dispensers. Examples of fluids besides dyes include coolants, photoreflective tissue shields, photoactivated tissue solders, fillers, or surface sealants. A new application for dye-micrdrop assisted laser ablation is the poration of soft tissue (e.g. skin) for intracellular fluid diagnostics and other applications. The image below illustrates this process.



Sequence of events in the collection of intracellular fluid: top - ink drop on the skin; middle - after the laser pulse; bottom - collection of the intracellular fluid.