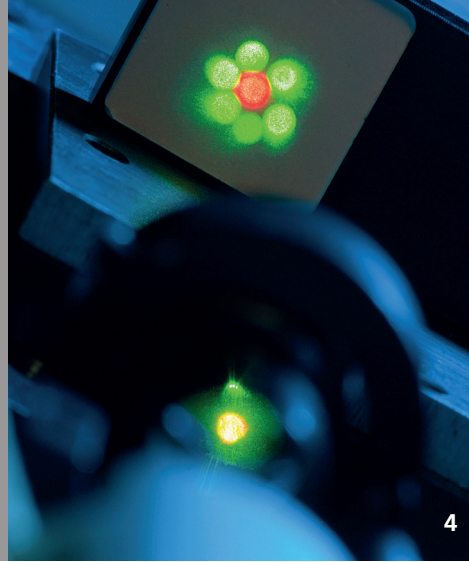


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HAND PIECE FOR LASER-INDUCED COAGULATION

Task

To improve the healing process after operations in oral, jaw, and facial surgery, Fraunhofer ILT has developed a laser-assisted wound closure process and the necessary system technology. The main objective is to provide a temperature-controlled laser for medical applications and to develop a fiber-optic hand piece for applying the laser radiation while simultaneously detecting the tissue temperature.

Method

Up to now, oral wounds and defects have had to be covered with compresses after surgical interventions or supplied with the patient's own skin or mucous membrane graft with often complex seam technology. By contrast, a new approach has been developed by using the approach investigated in the »Biophotonic Technologies for Tissue Repair BI-TRE« project for wound dressing with collagen membranes, which are attached to the mucous membrane with lasers.

Results

In order to implement the objectives of »BI-TRE«, experts from Fraunhofer ILT have developed a process that enables them to adapt the optical penetration depth to the tissue optimally by using two different wavelengths. The coagulation state or the strength of tissue coagulation during the treatment can be determined by means of an optical return channel for the detection of process signals. So that the laser can be used

especially in oral, maxillofacial and facial surgery, a hand piece has been developed in the research consortium; integrated in it are a laser fiber to transport the laser radiation as well as fibers to detect a temperature signal and other optical signals. This ensures that the treating physician can safely maintain the permissible temperature range and that the tissue is minimally affected. The wound closure takes place via a transparent collagen membrane, which is penetrated by the laser and fixed as a wound overlay onto the tissue.

Applications

In addition to oral surgery, a seamless wound closure in plastic and general surgery can be used whenever a cosmetically perfect result – without scarring and marks – is desired.

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Contact

Dr. Martin Wehner
Telephone +49 241 8906-202
martin.wehner@ilt.fraunhofer.de

Dr. Arnold Gillner
Telephone +49 241 8906-148
arnold.gillner@ilt.fraunhofer.de

3 Laboratory pattern of a hand piece for oral surgery (source: LifePhotonic).

4 Radiation characteristics of a fiber bundle for laser therapy with optical diagnostics.