

THE EFFECT OF THERMAL LENSING DURING SELECTIVE PHOTOTHERMOLYSIS

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ABSTRACT. The results of an integrated Monte Carlo and finite difference simulation of laser light propagation and heat transfer in the skin are reported. The study was performed to examine the effects of the change in refractive index that results during laser irradiation of tissue. When skin is irradiated with laser light its surface temperature rises dramatically. This results in a change in the refractive index of the tissue which has been shown in model systems to result in thermal lensing of the laser light. This paper reports on the development of a model to study the effect of thermal lensing on laser light propagation through skin as a function of beam geometry and incident irradiance. It was found that for high irradiance thermal lensing can result in a significant decrease in the predicted epidermal fluence, although it has only a small effect on overall beam penetration.