

# Influence of CO<sub>2</sub> Laser on Optical Properties of Human Blood Plasma

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## **Abstract**

The optical properties of human blood plasma play a central role in laser-based medical diagnostics and therapy. Accurate characterization of these parameters is essential for improving optical models and enabling advanced, automated tissue-analysis systems. This study investigates the optical response of human blood plasma subjected to CO<sub>2</sub> laser-induced photothermal excitation at power levels ranging from 1 to 10 W. At 1 W, the absorbance values were 0.1531 a.u. and 0.1984 a.u. at 670 nm and 960 nm, respectively. Increasing the laser power to 10 W produced a 49% elevation in all measured optical parameters, attributed to increased effective sample concentration caused by water evaporation within the irradiated plasma volume. These results highlight the sensitivity of plasma optical behavior to thermal loading and emphasize the need for precise control of irradiation conditions in biomedical laser applications to ensure accurate diagnostics and optimized therapeutic performance.