

Laser Activated Gold Nanorods for the Photothermal Treatment of Cancer

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Abstract

Photothermal therapy through Gold Nanorods (GNRs) is a new approach for the minimally invasive treatment of cancerous tissue. In order to design the proper approach, it is important to study the thermal effect that are induced close the nanoparticle (nanoscale model), in the close vicinity (microscale model) and in the cancerous tissue (macroscopic model).

In order to do this a temperature dependent 2D-model of this particular light-material interaction was designed. The expected absorption cross section of the GNRs were used to calculate the optical absorption of the GNR. The bioheat equation then enabled to describe the photothermal effect within the GNRs and the environment. The postprocessing results may be used to evaluate a safe and feasible temperature range and treatment time, in order to destroy the tumor volume.