Zurich University
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School of
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Hyperthermia therapy with nanorods: Designing an Infrared-LED excitation system

In recent years, innovative techniques in the area of Nanotechnology have been developed in order to improve treatment of various diseases, such as cancer, on a cellular level. A novel method that is being investigated in greater detail is the application and combination of hyperthermal properties using gold nanorods. This unique combination is a selective way of detecting and destroying malignant cells without damaging healthy ones. Early results have shown that this combination displays many advantages over current methods, like photodynamic dyes. An essential part of this new therapy is the use of a near infrared (NIR)-radiation source needed for the excitation of the gold nanorods. Primary investigations carried out on the hyperthermic-gold nanorod combination have shown promising results on cultured cells and in mice. However, the behaviour and toxicity of this combination have yet to be fully investigated. With this in mind the aims for this Bachelor thesis were determined as follows (i) to design and develop an excitation device for laboratories using NIR-light-emitting diode (LED), (ii) to run tests and prove that they can be used to excite the gold nanorods sufficiently, (iii) to determine if it is possible to use lock-in-thermography as a way of excitation as well and (iv) to determine and resolve any weaknesses in the prototype. An appropriate prototype was developed but further research is required in resolving prototype weaknesses.

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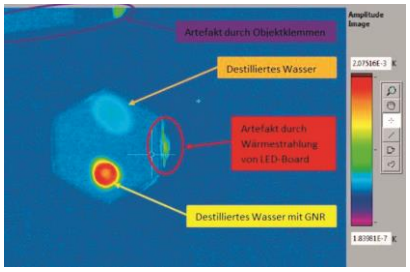
A first prototype of the developed excitation device for gold nanorods



One of the measurements acquired with the device, which shows two samples of distilled water with the bottom one containing gold nanorods