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Aiming at reliable luminescence thermal sensing: basic strategies to overcome the problem of light attenuation in tissues.

Abstract:

Luminescence thermometry is a fast-developing technique with great potential *for in vivo* sensing, diagnosis, and therapy. Unfortunately, serious limitations have been recently reported.[1] The most problematic one being the distortion of the luminescence, generated by nanothermometers from which the thermal readout is obtained, by the presence of biological tissues. Such distortions lead to low signal levels and entangle absolute and reliable thermal monitoring of internal organs. Overcoming such limitations requires the use of not only high-brightness luminescent nanothermometers but also the implementation of more complex approaches for temperature estimation.

In this talk, I will highlight some of these strategies. In particular, I will emphasize the use of super-bright Ag_2S nanothermometers for thermal sensing in (i) a tumour during laser-induced hyperthermia and (i) inside the liver, under normal conditions, of small animals. While the first strategy is based on the use of multiparametric thermal sensing, the second relies on the synergy between *in vivo* measurements and *in silico* simulations. The results that will be here presented provide ingenious routes toward the consolidation of luminescence thermometry as a convincing technique for high sensitivity preclinical thermal sensing, while also constituting a step toward improved photothermal therapies.

[1] Y. Shen; J. Lifante; N. Fernandez; D. Jaque & E. Ximendes. ACS Nano **2020**, 14, 4, 4122-4133 (https://pubs.acs.org/doi/abs/10.1021/acsnano.9b08824)