



Controlling plasmonic mediated intracellular hyperthermia via fluorescent nano-thermometers.

Laura Martínez Maestro

FIG, Departamento de Física de Materiales, Universidad Autónoma de Madrid.

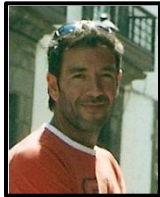
19 July 2012



Working Team

Departamento de Biología, UAM

Biologists:



Francisco Sanz Rodríguez



M^a Ángeles Juarranz

Departamento de Fisiología, UAM

Pharmacists:



M^a Carmen Iglesias de la Cruz

Departamento de Física de Materiales, UAM

Physicists:



Laura
Martínez Maestro



Daniel
Jaque García



José
García Solé

Departamento de Física Fundamental y Experimental, Electrónica y Sistemas, Universidad de La Laguna.

Physicists :



Patricia Haro González



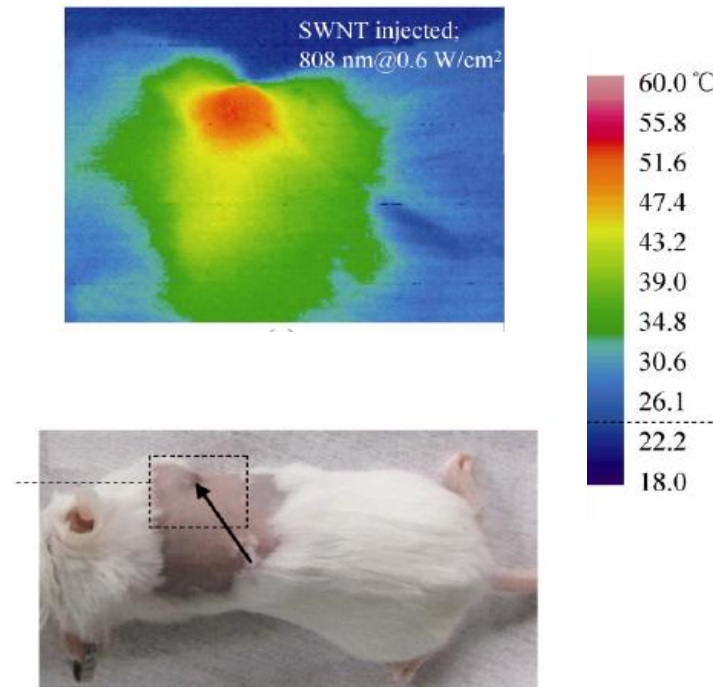
Outline

- **Hyperthermia.**
- **GNRs as nano-heaters.**
- **CdSe QDs as nano-thermometers.**
- **Controlled intracellular hyperthermia.**



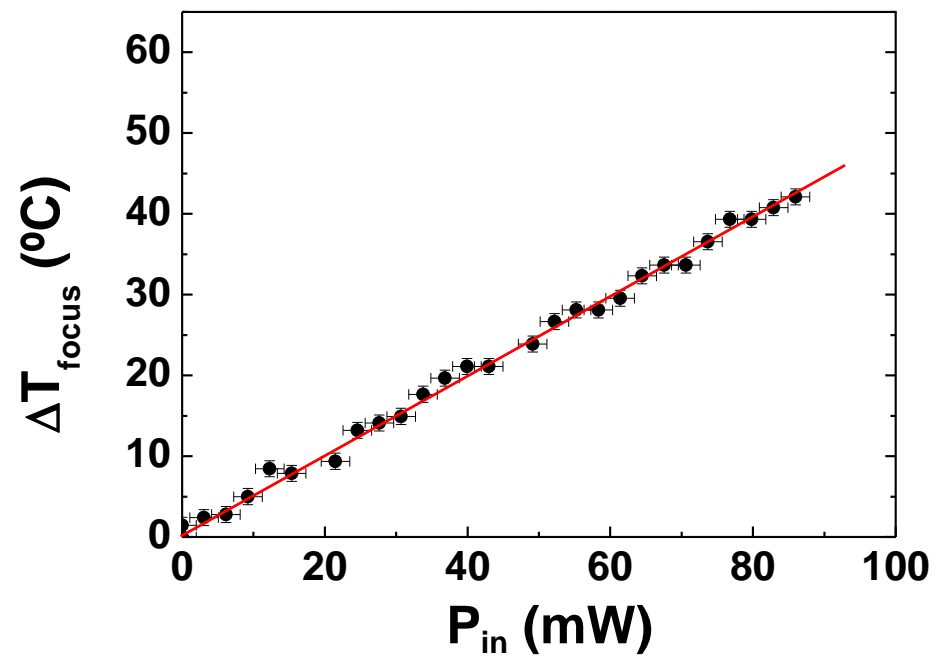
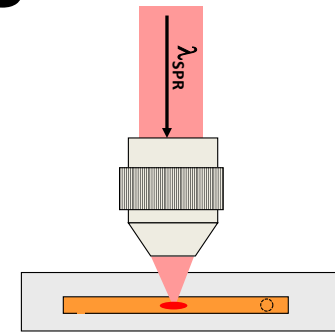
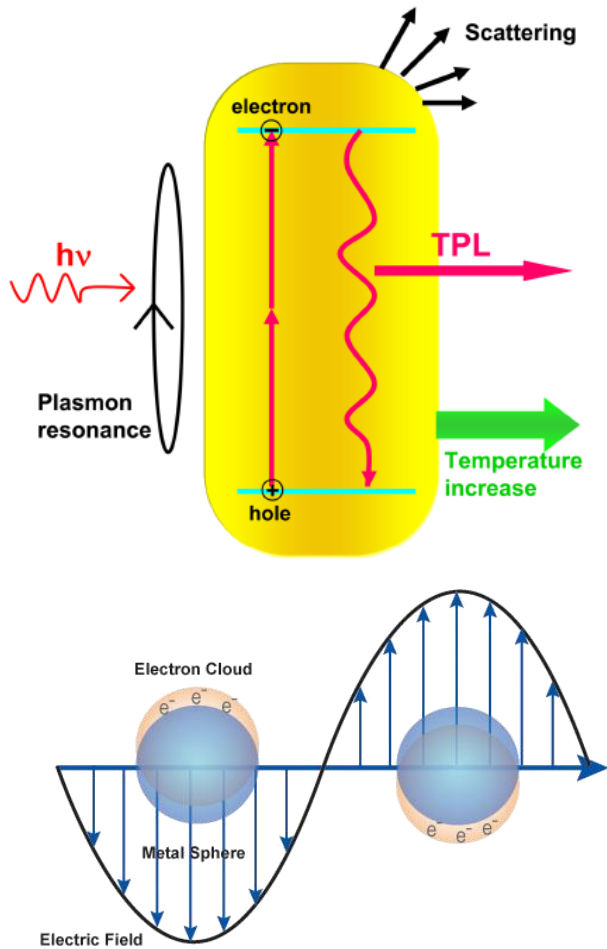
Why is this interesting?

Traditional methods:
Increases the
temperature in an
uncontrolled way
leading to **collateral**
damage in the
surrounding tissue.

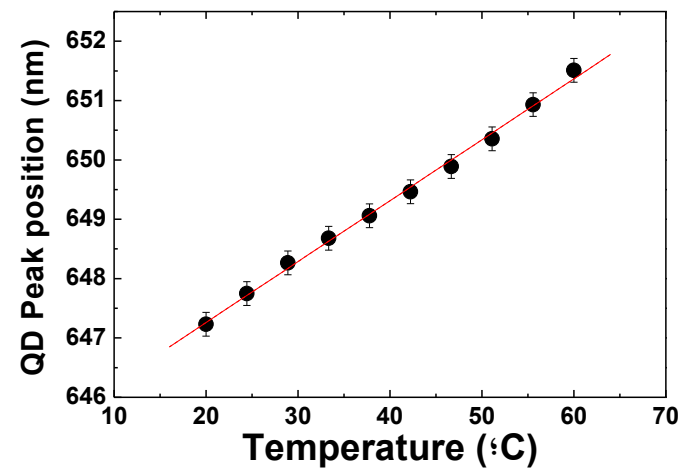
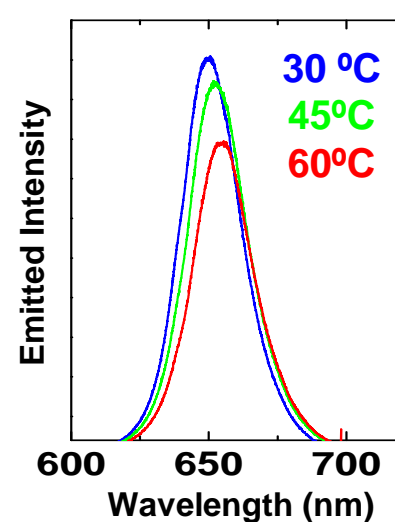
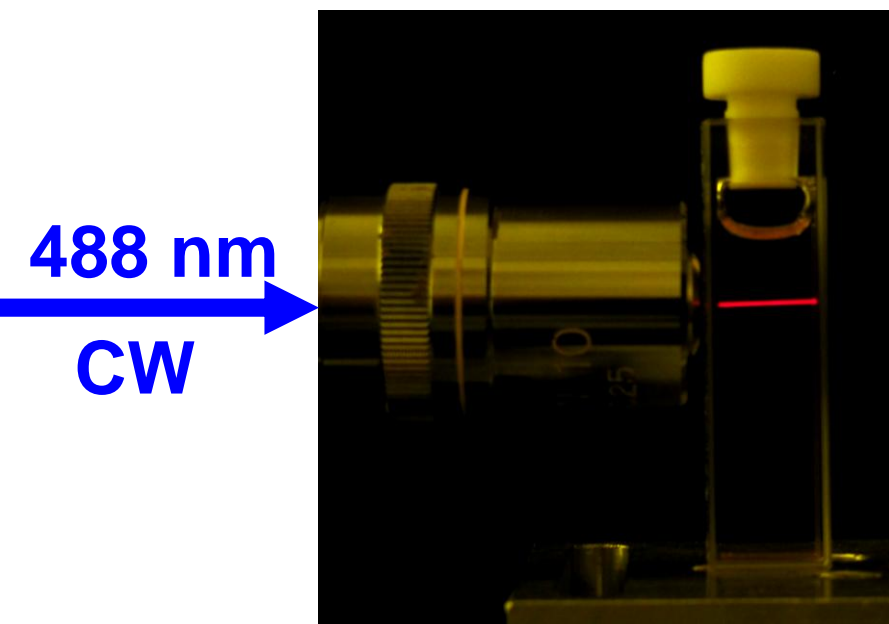


Thermal imaging of a tumor during photothermal treatment.

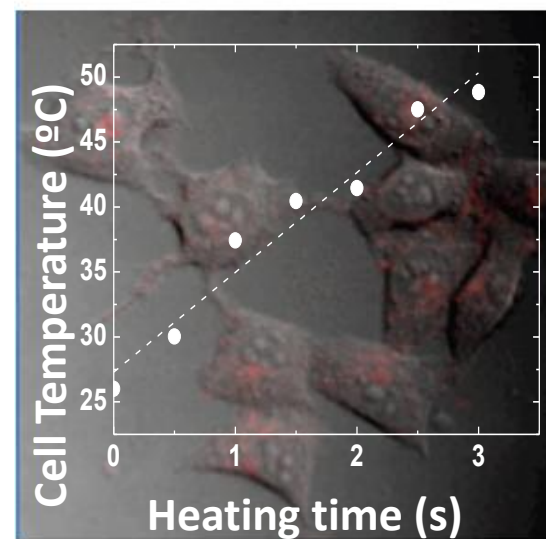
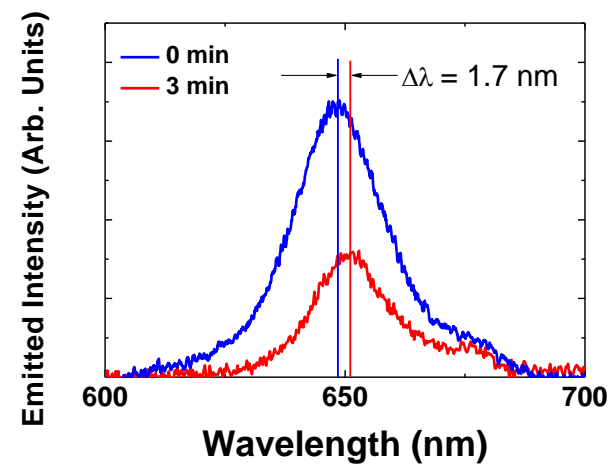
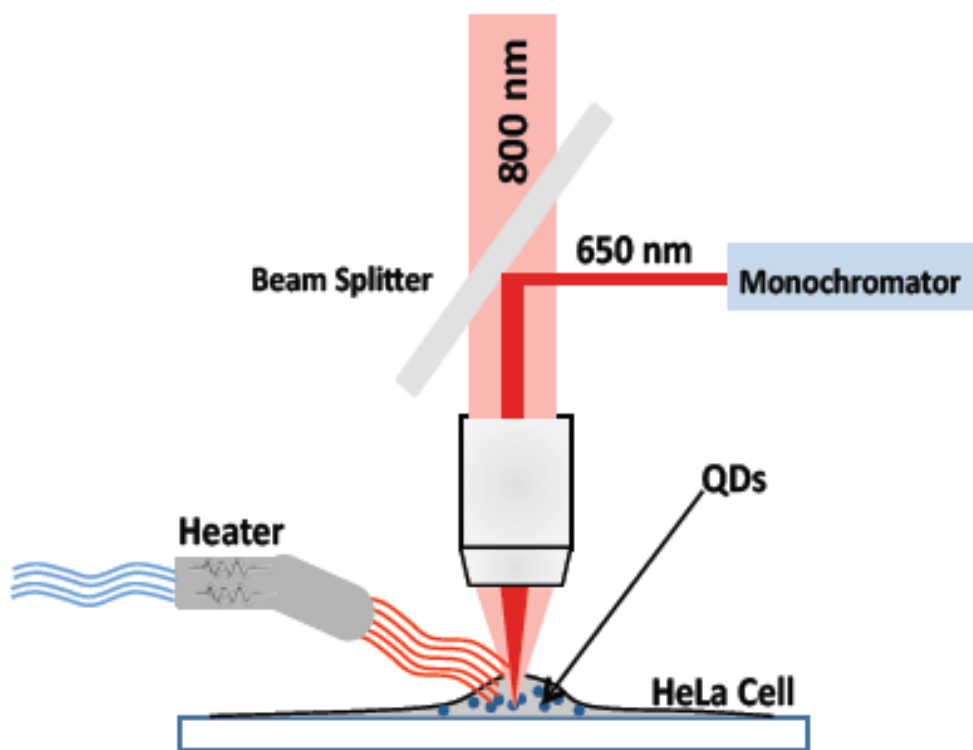
GNRs as nano-heaters



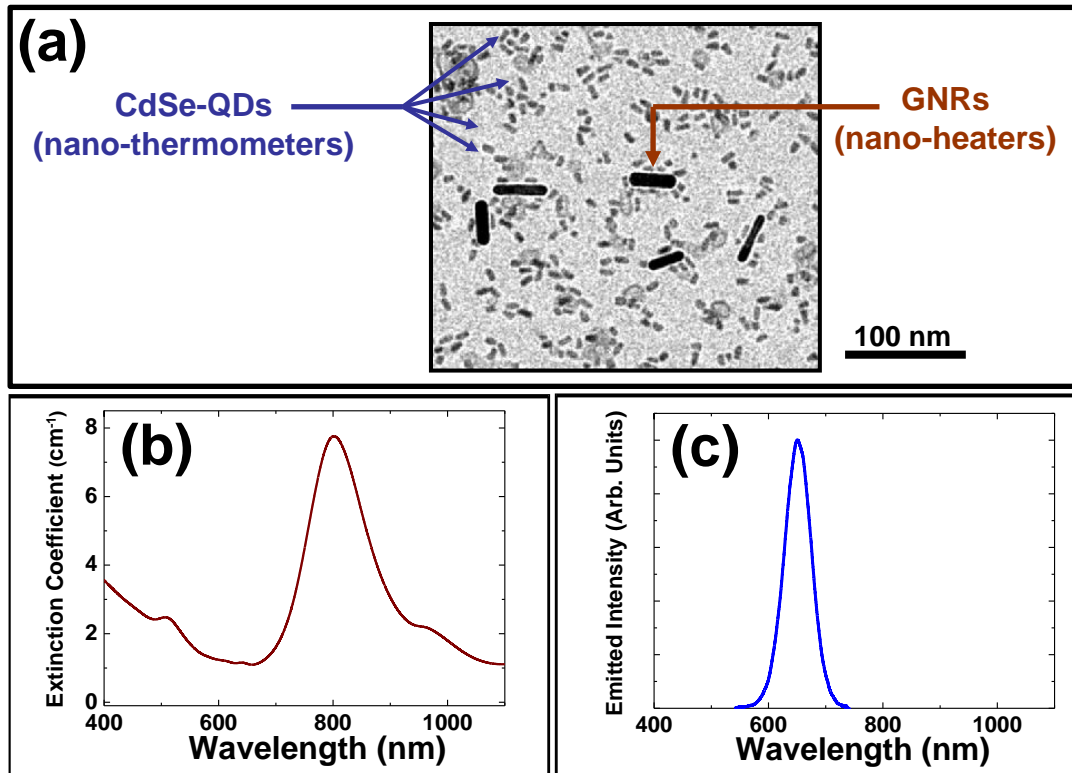
CdSe QDs as nano-thermometers



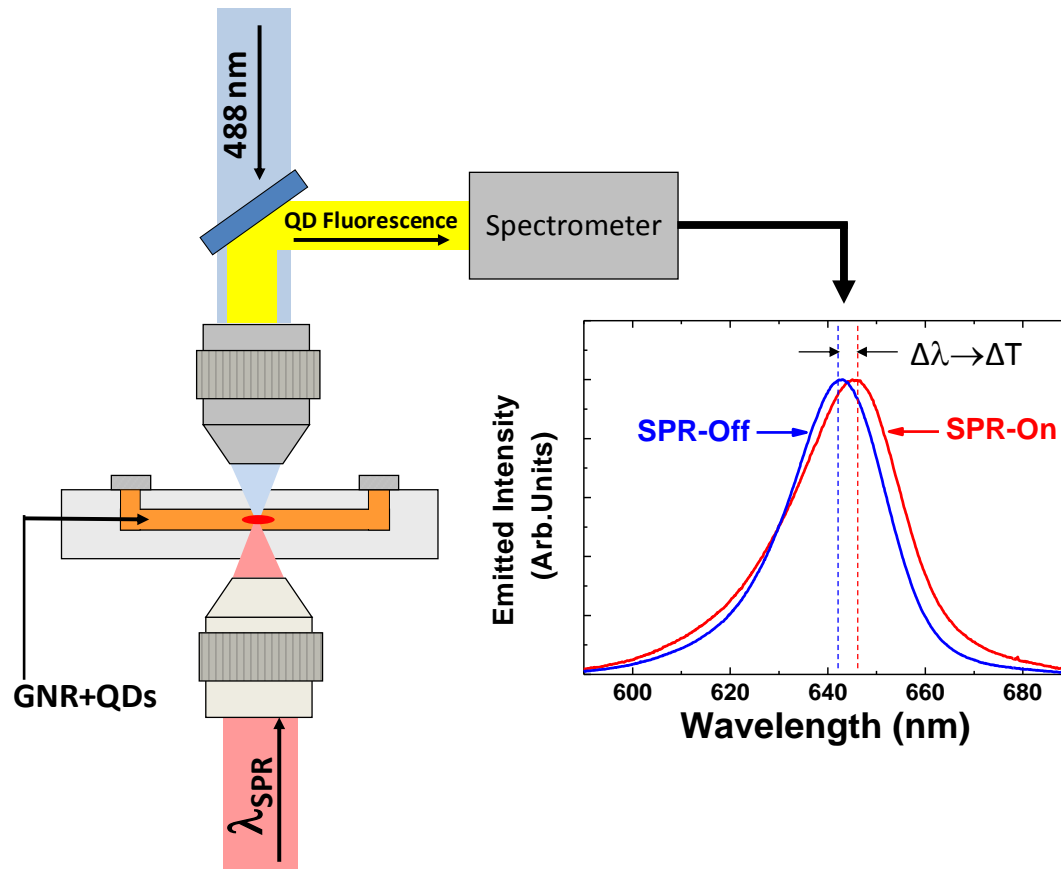
Intracellular temperature measurement with CdSe QDs



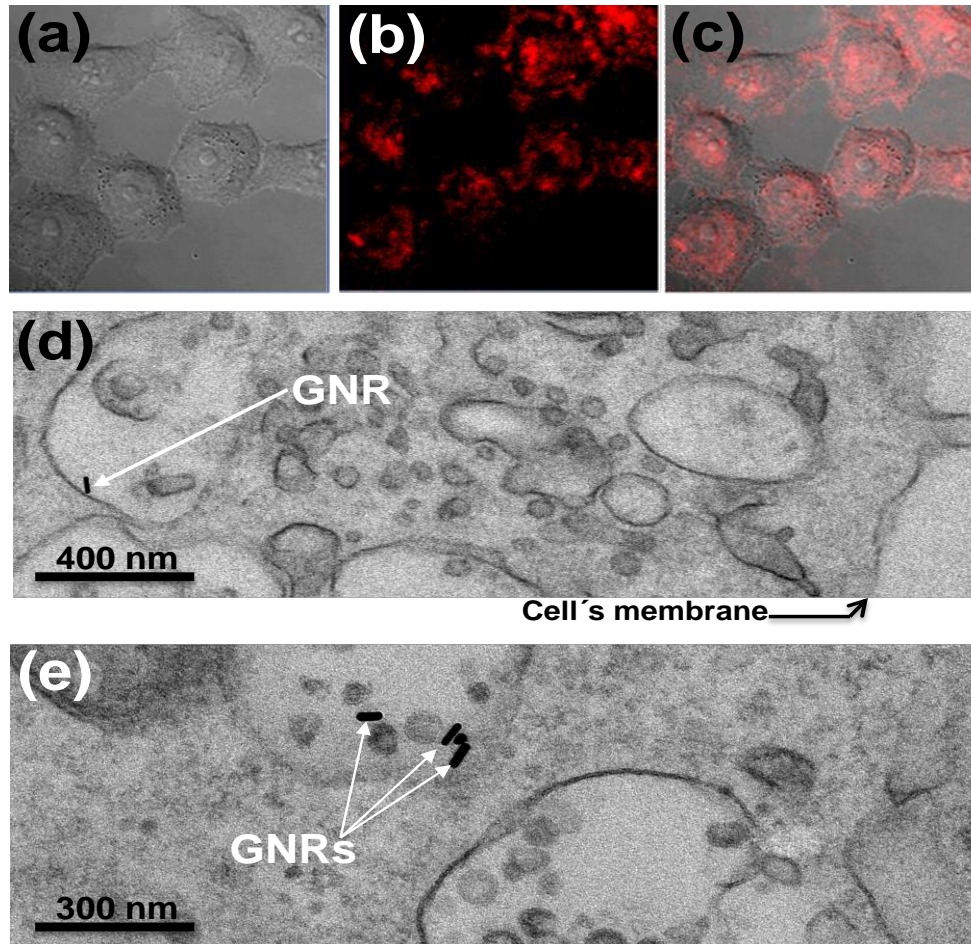
Mixing nano-thermometers with nano-heaters



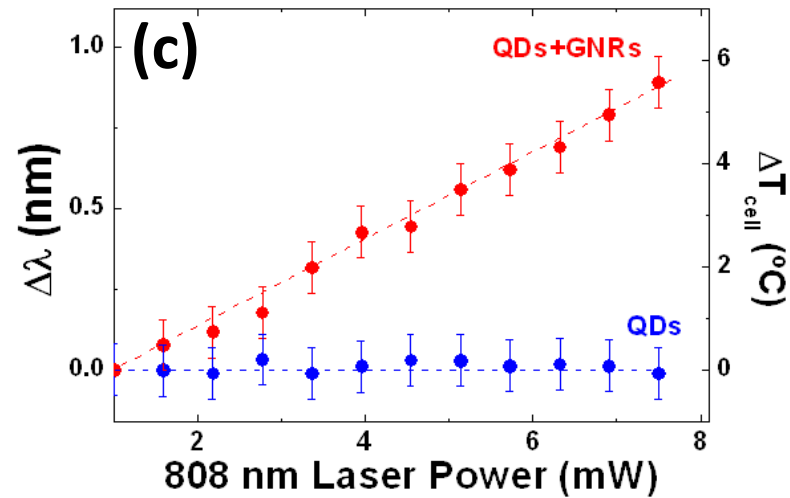
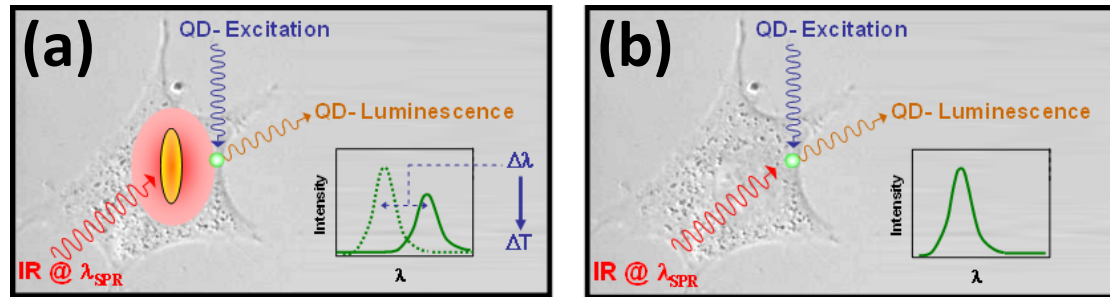
Experimental Set-up



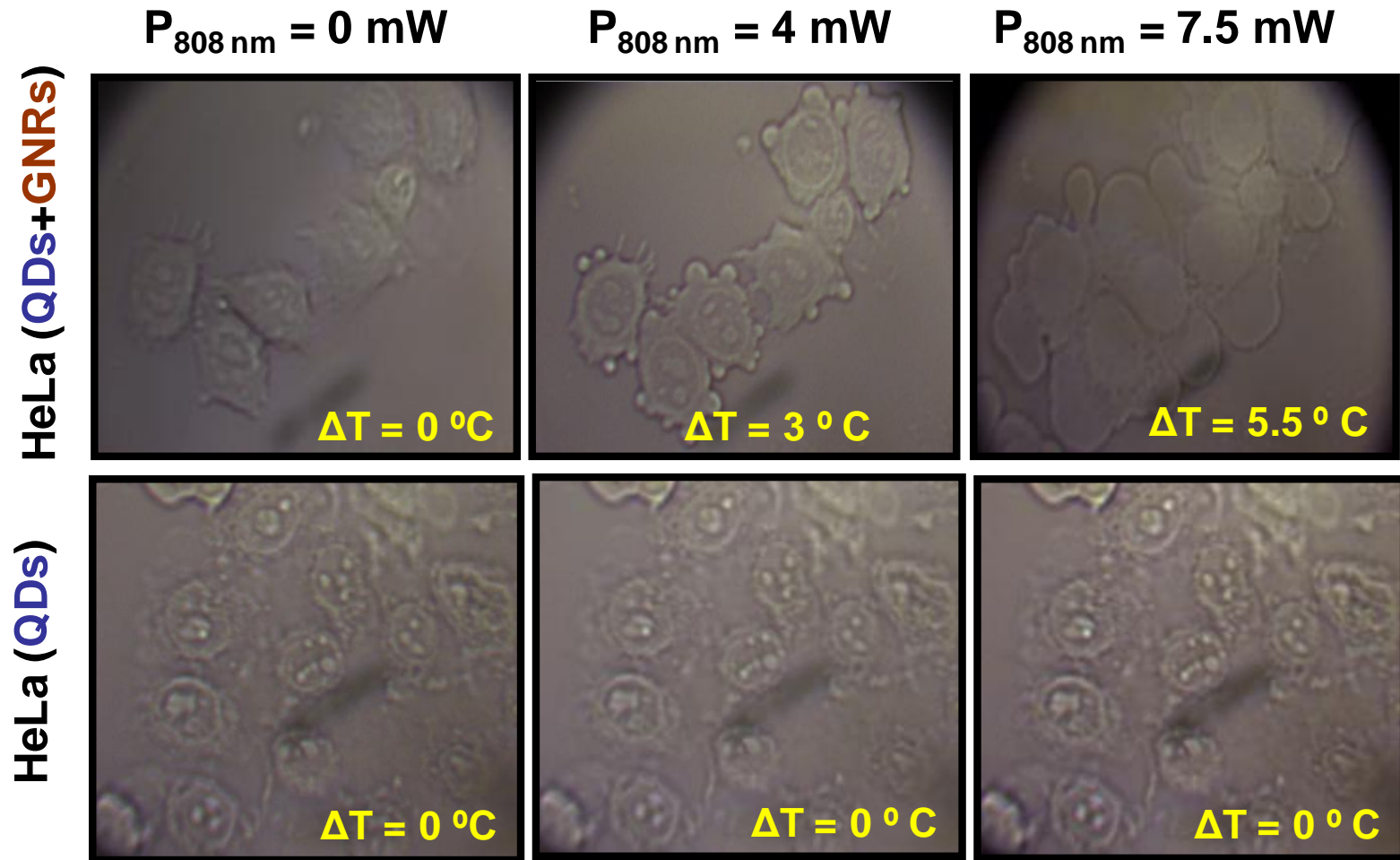
Incubations in HeLa cells



Controlled hyperthermia in HeLa Cells



Controlled hyperthermia in HeLa Cells



Conclusions

- We have been able to incorporate simultaneously nano-heaters and nano-thermometers in cancer cells.
- We have been also able to build up a double beam confocal microscope that allows cell heating and temperature reading in a simultaneous way.
- We provide evidence of controlled laser-induced hyperthermia at the cellular level. Temperature reading was obtained during hyperthermia treatment allowing for an unequivocally identification of the laser-induced morphological changes taking place during treatment.



Thank you for your attention





Controlling plasmonic mediated intracellular hyperthermia via fluorescent nano-thermometers.

Laura Martínez Maestro

FIG, Departamento de Física de Materiales, Universidad Autónoma de Madrid.

19 July 2012

