WORKSHOP INVESTIGACIÓN FACULTAD DE FARMACIA 2023

Biosensores y microscopía de fluorescencia aplicada a ciencias farmacéuticas

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Departamento de Química-Física

Universidad de Castilla-La Mancha

Plan de trabajo

Sensores fluorescentes

- Síntesis
- Caracterización fotofísica
- Sensibilidad fluorescencia

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Parámetros biológicos

- Fotofísicos (pH, viscosidad)
- Macromoléculas (Proteínas, glucosa)

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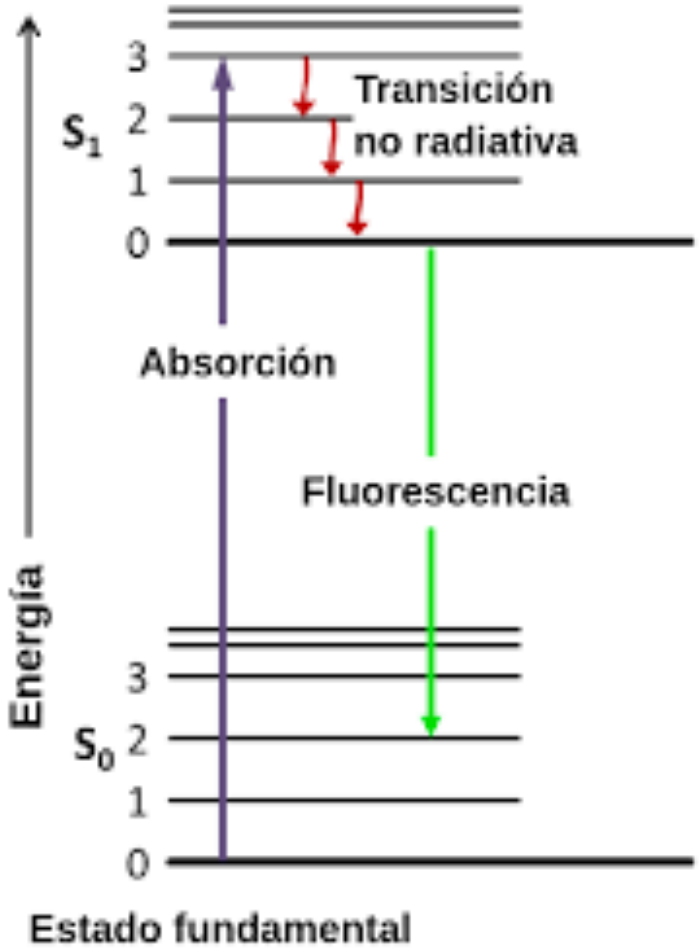
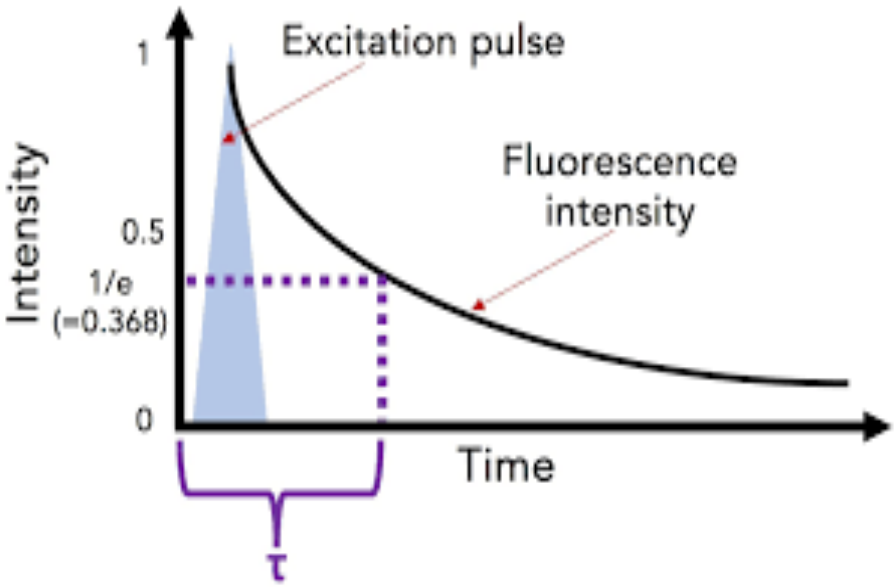
Aplicación biológica

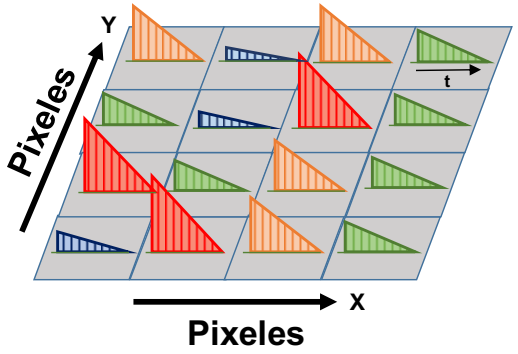
- Estudios de nuevos fármacos antitumorales
- Monitorización del estrés celular

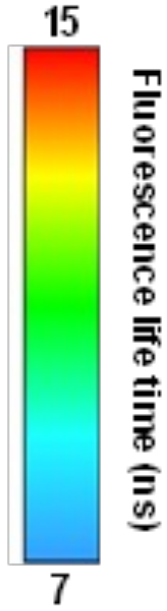
Tiempo de vida de fluorescencia

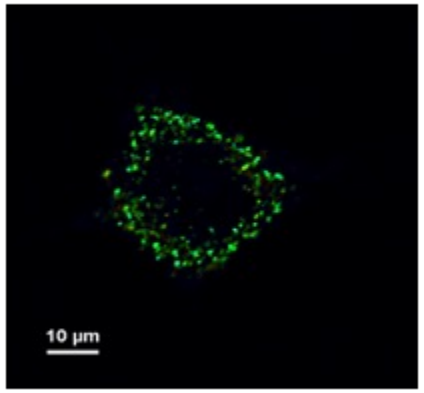


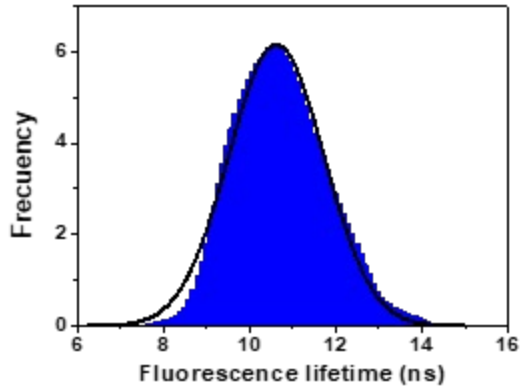


Fluorescence Lifetime Imaging Microscopy (FLIM)



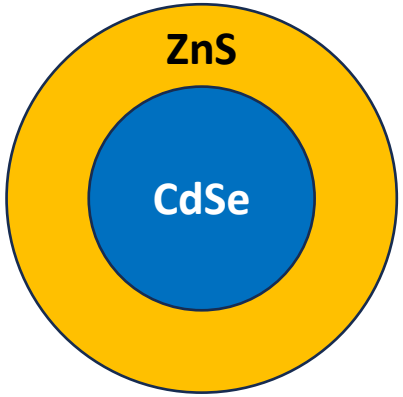






Tipos de nanopartículas

Quantum dots



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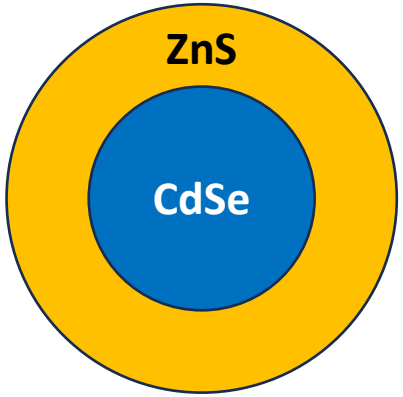

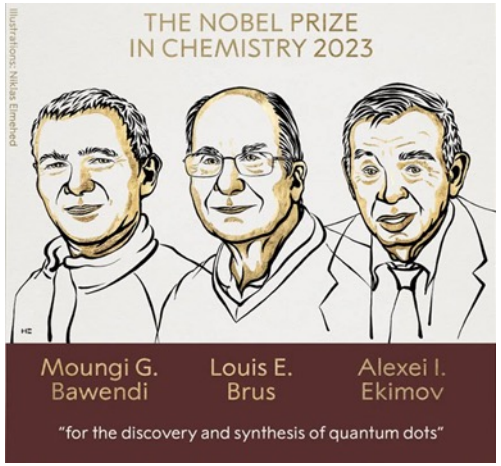

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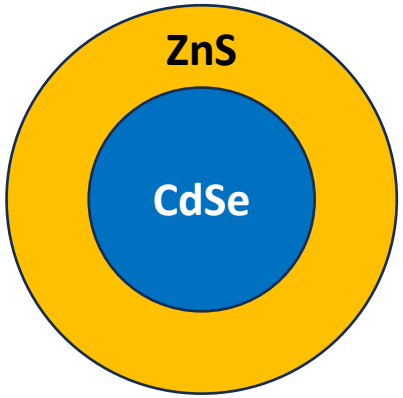
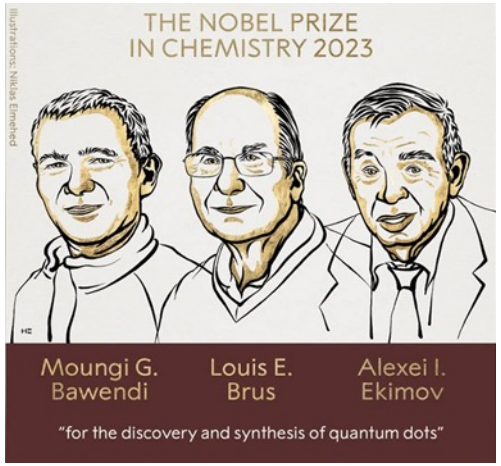
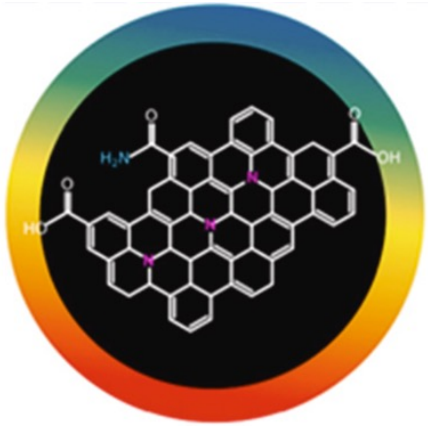




Carbon dots



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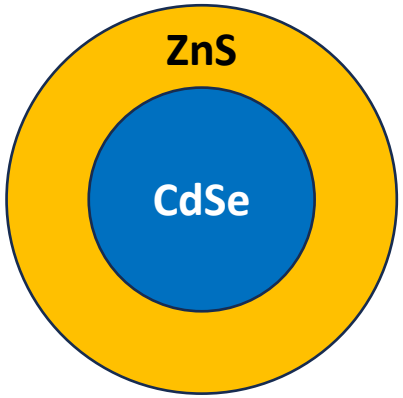
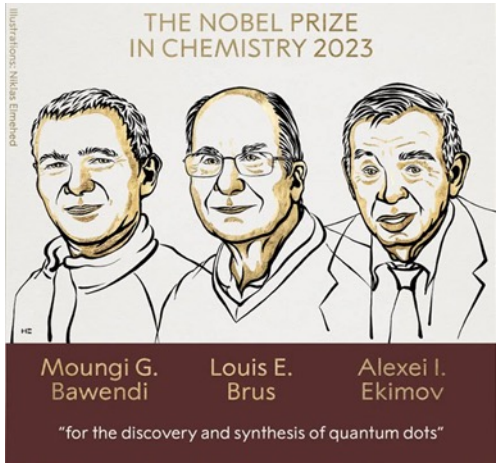
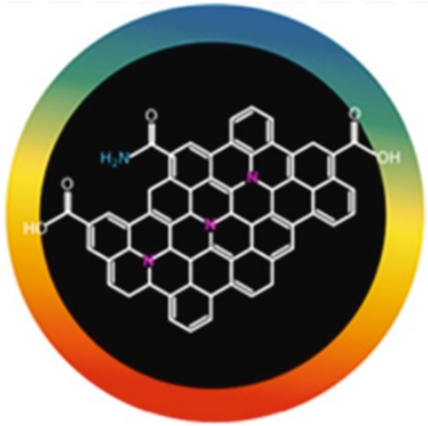
Quantum dots

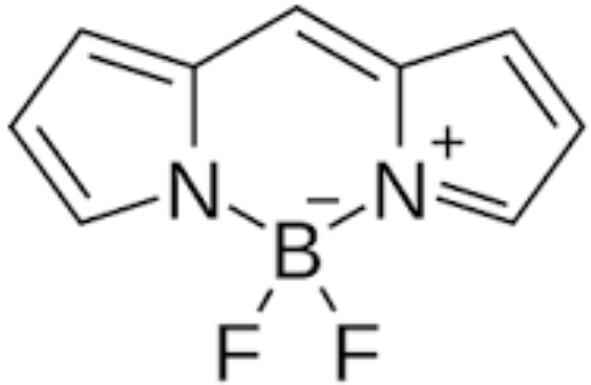




Carbon dots

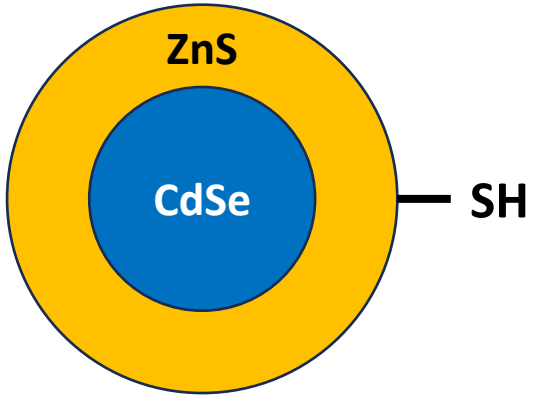


Moléculas orgánicas



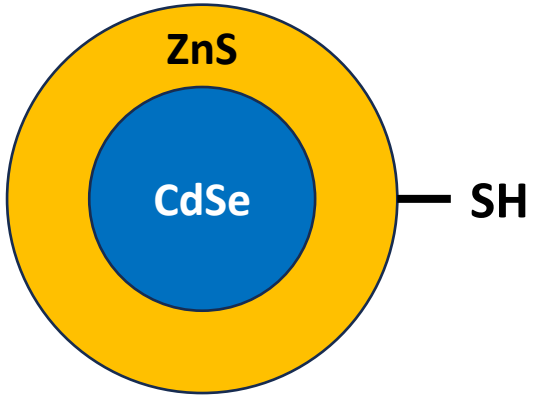
BODIPY

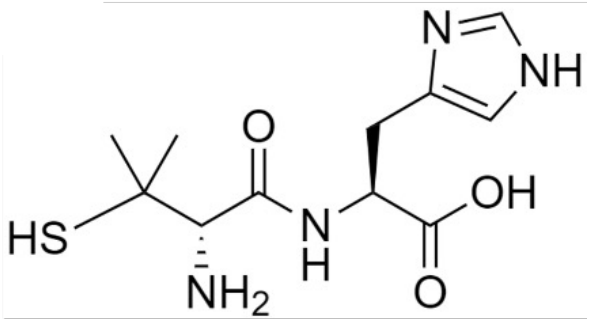
Quantum dots



- **Características fotofísicas**
- **Especificidad**
- **Solubilidad y estabilidad**
- **Sensibilidad**

Quantum dots





DPA-His

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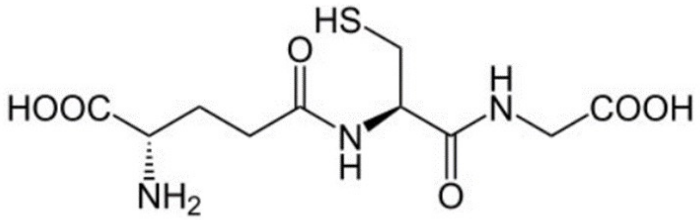
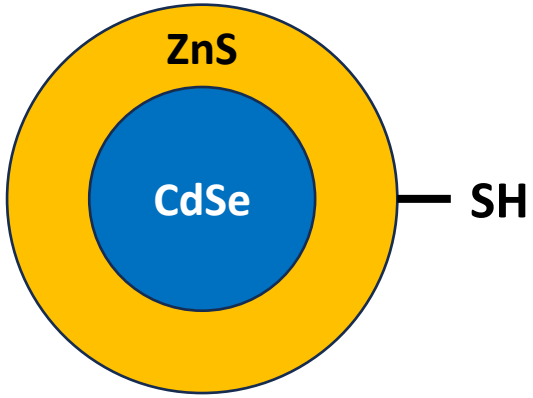
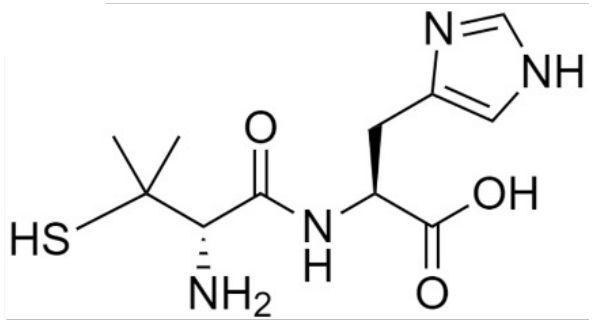


GSH

Quantum dots





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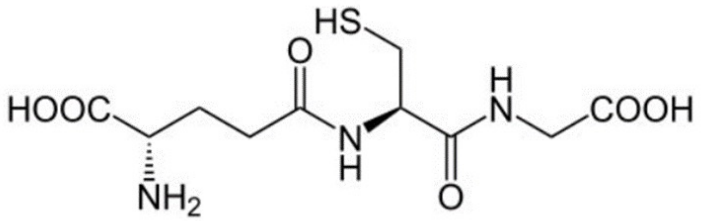
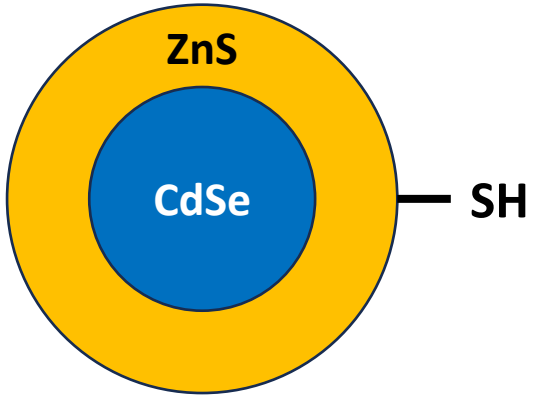
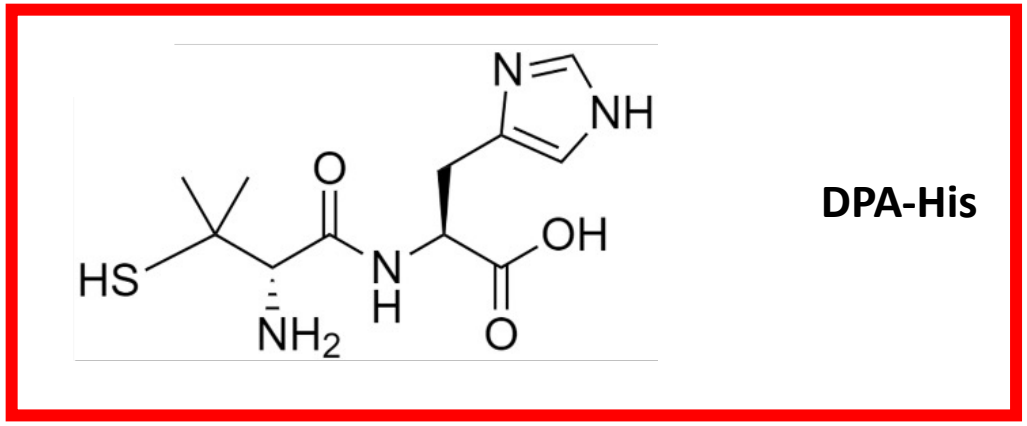


GSH

Nanopartículas sensibles al pH

Quantum dots





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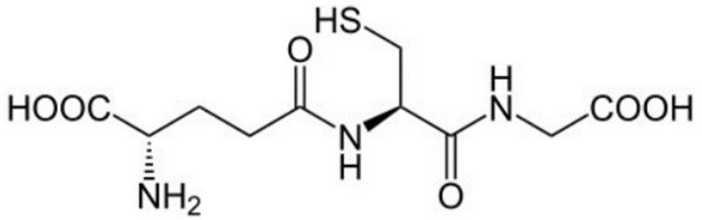
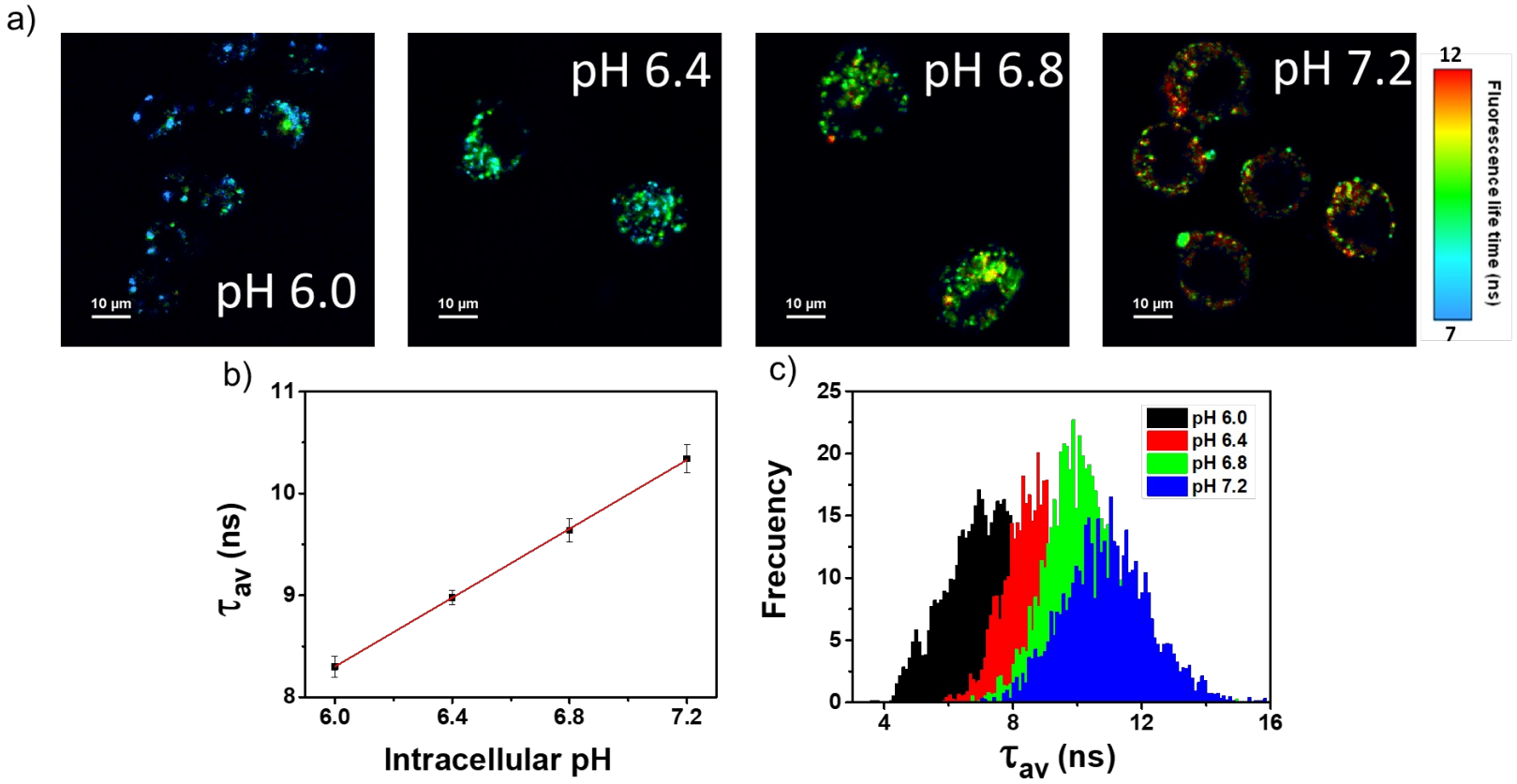


GSH

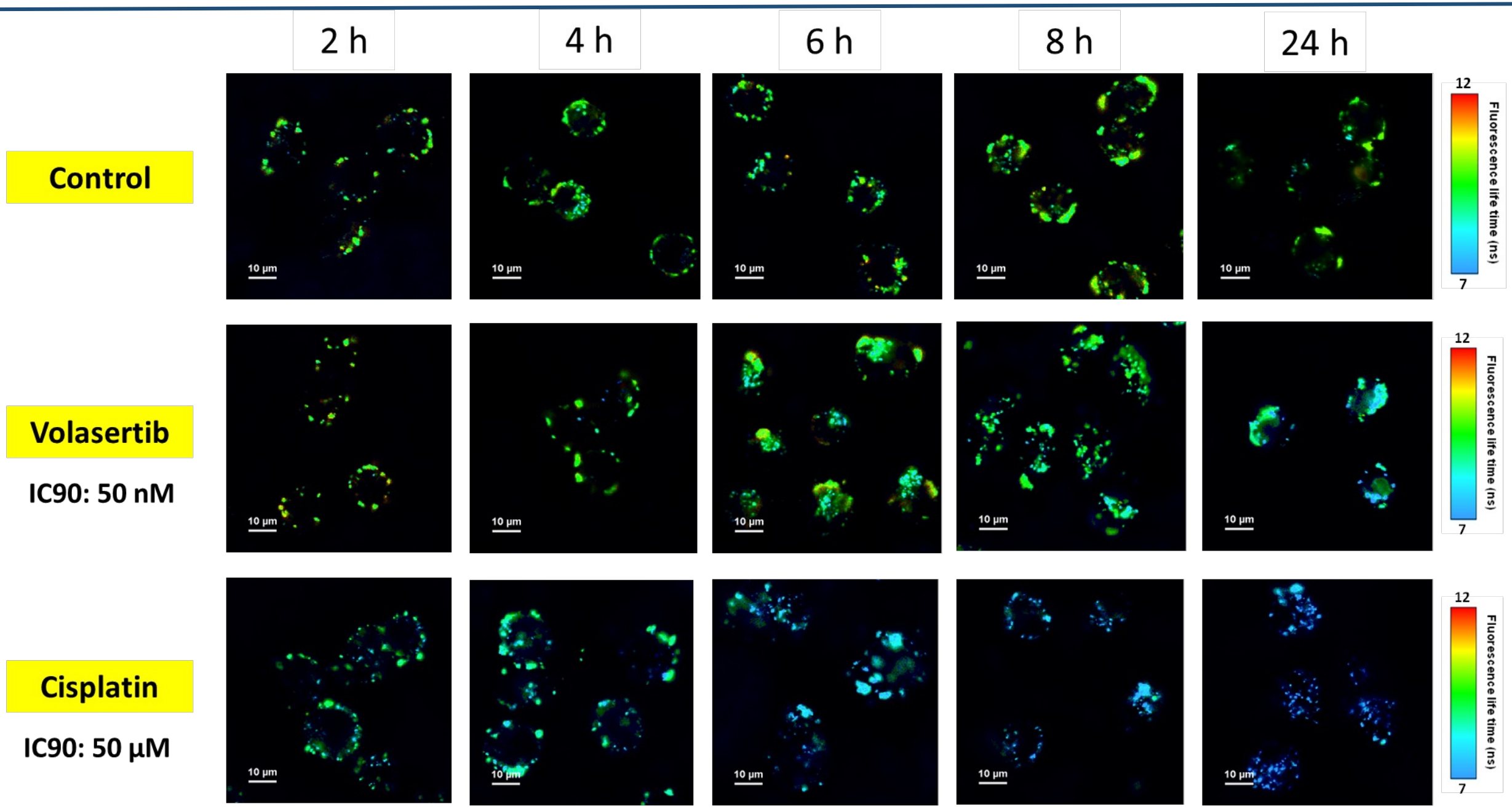
Nanopartículas sensibles al pH

QD-DPAHis: Sensibilidad al pH

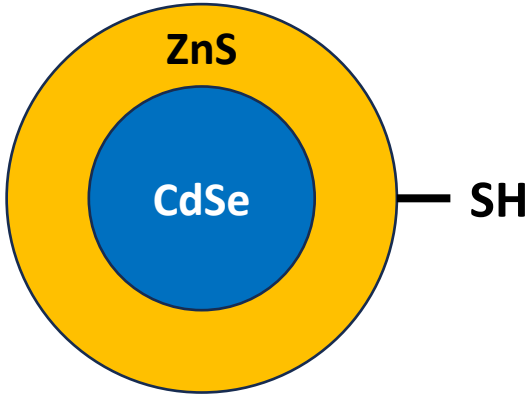


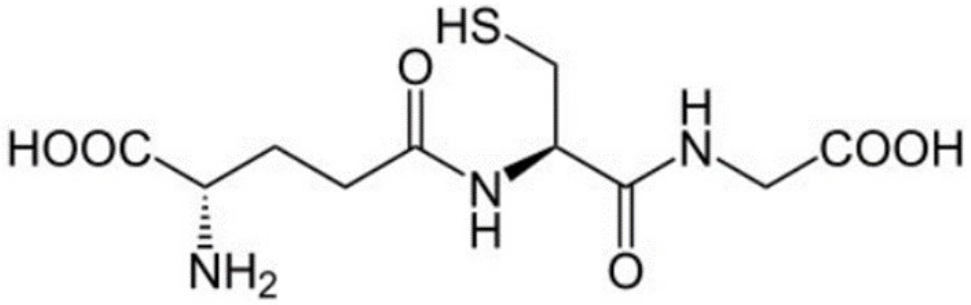
Monitorización del pH intracelular

QD-DPAHis: Monitorización del pH intracelular

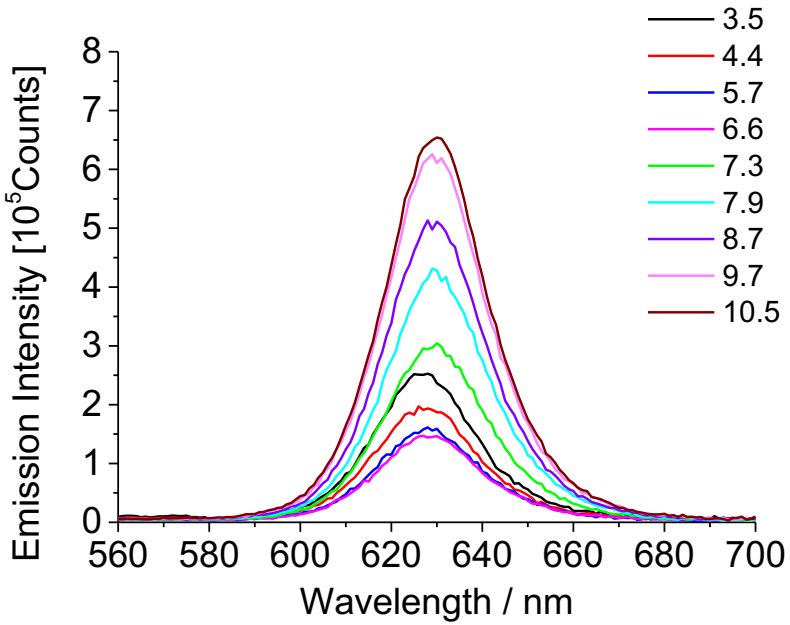


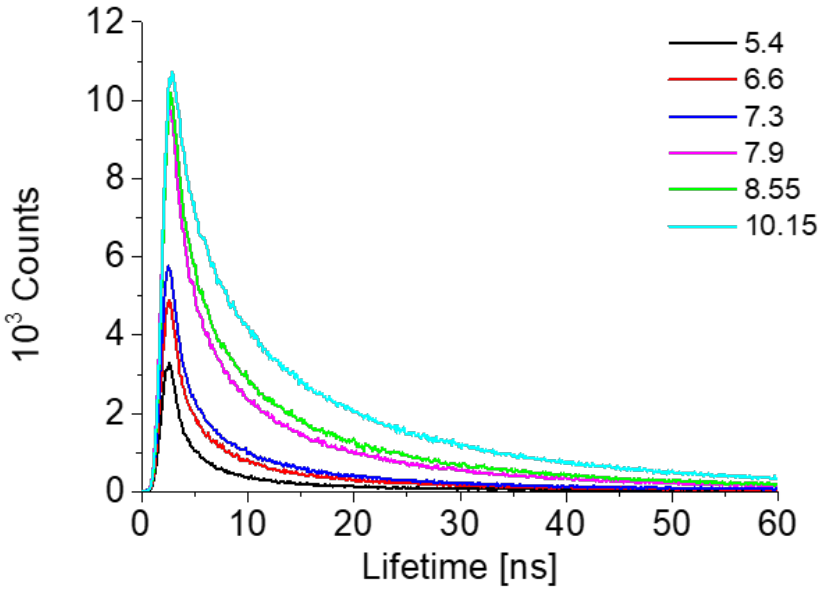
QD-GSH


ZnS
CdSe
SH


HS
O
HOOC
N
H
H
N
COOH
NH2
O

GSH


Emission Intensity [10^5Counts]
Wavelength / nm
3.5
4.4
5.7
6.6
7.3
7.9
8.7
9.7
10.5


10^3 Counts
Lifetime [ns]
5.4
6.6
7.3
7.9
8.55
10.15

QD-GSH

Published in final edited form as:
J Biomed Nanotechnol. 2017 February ; 13(2): 155–166. doi:10.1166/jbn.2017.2337.

Effect of nanoparticle surface coating on cell toxicity and mitochondria uptake

Hong Zheng[1], **Luke J. Mortensen**[2], **Supriya Ravichandran**[2], **Bentley Karen**[3], **Lisa A. DeLouise**[1,2,*]

[1]Department of Dermatology, University of Rochester Medical Center, Rochester, New York 14642, USA.

[2]Department of Biomedical Engineering, University of Rochester, Rochester, New York 14642, USA.

[3]Department of Pathology and Laboratory Medicine, University of Rochester Medical Center, Rochester, New York 14642, USA.

CdSe/ZnS-GSH

↓

Acumulación en mitocondria

↓

Sensor pH mitocondrial

QD-GSH

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CdSe/ZnS-GSH

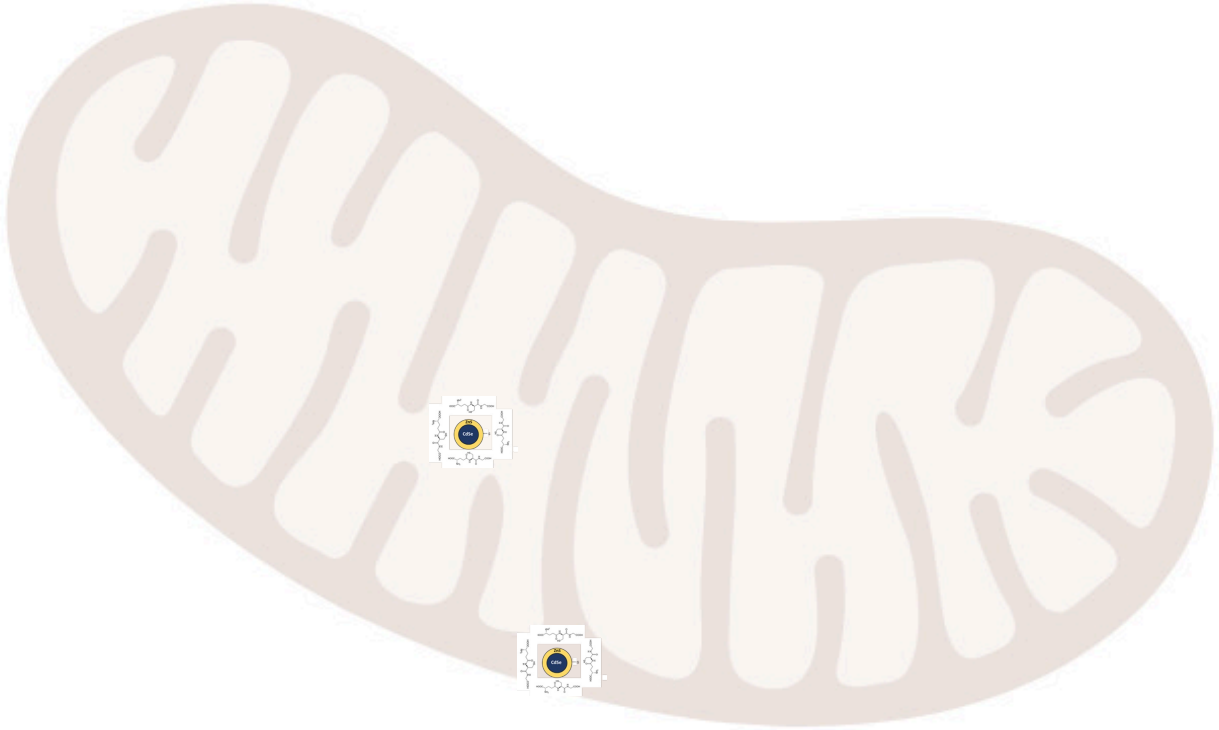
↓

Acumulación en mitocondria

↓

Sensor pH mitocondrial

QD-GSH y mitocondrias

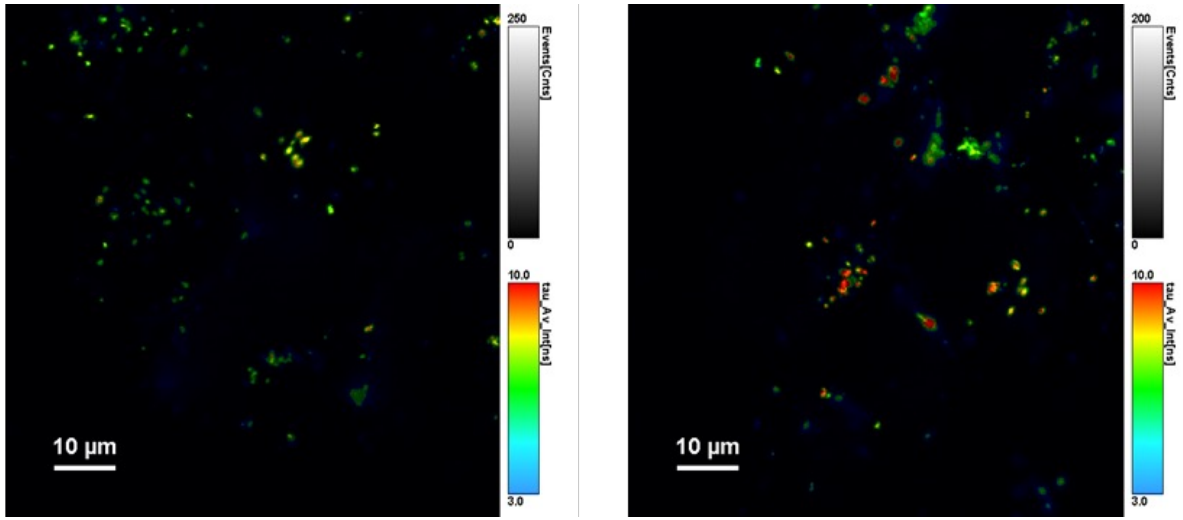


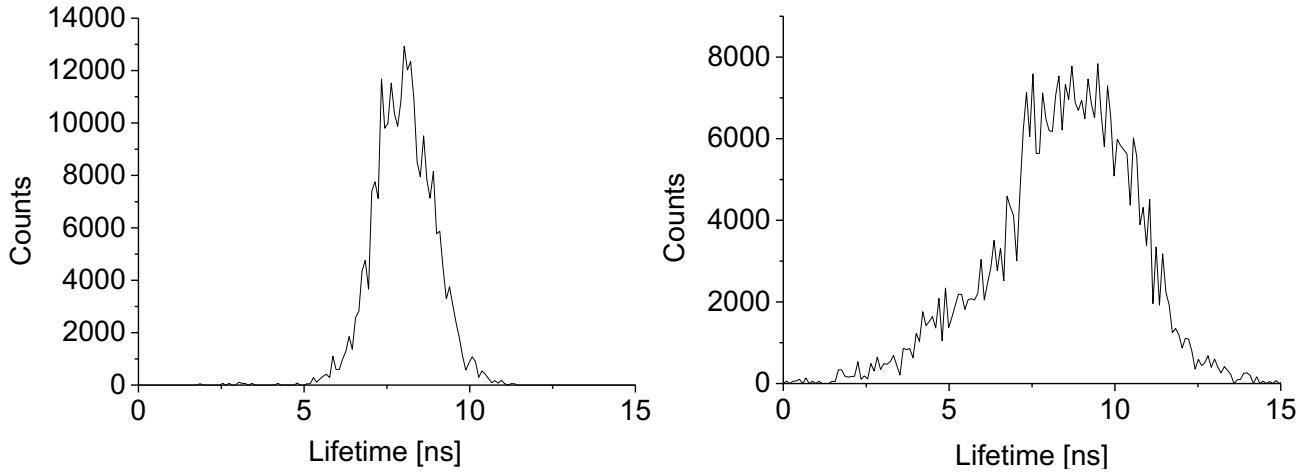
Estudios de colocalización con microscopía de superresolución

University of Cologne

QD-GSH y mitocondrias

Nigericine-treated cells for one hour.





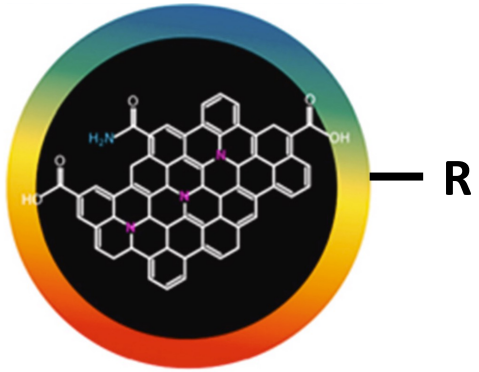
pH changes in drug treated cells

Estudiar especificidad mitochondria

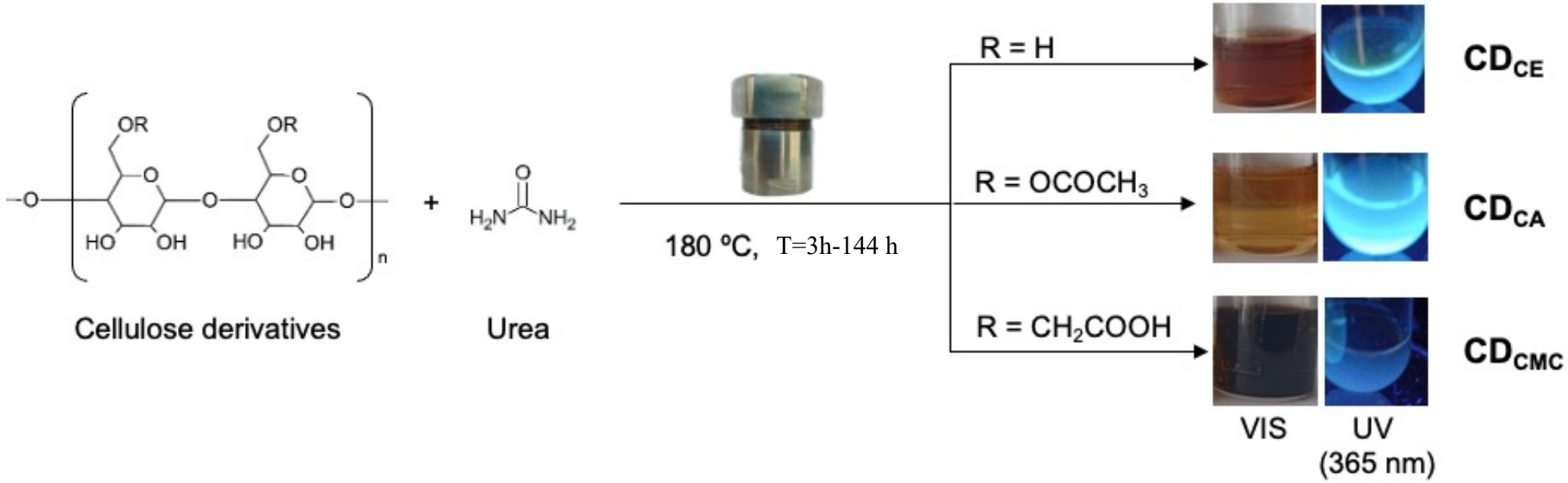
Estudiar cambios pH al tratar con drogas específica mitocondria

Carbon dots

Universitat d'Alacant
Universidad de Alicante

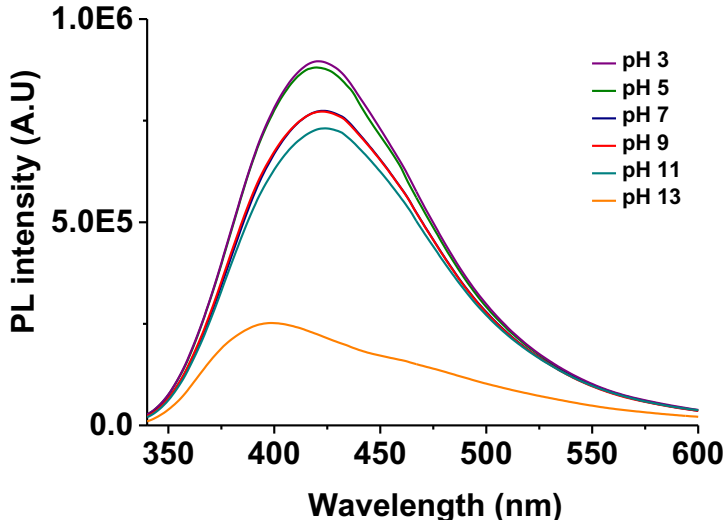


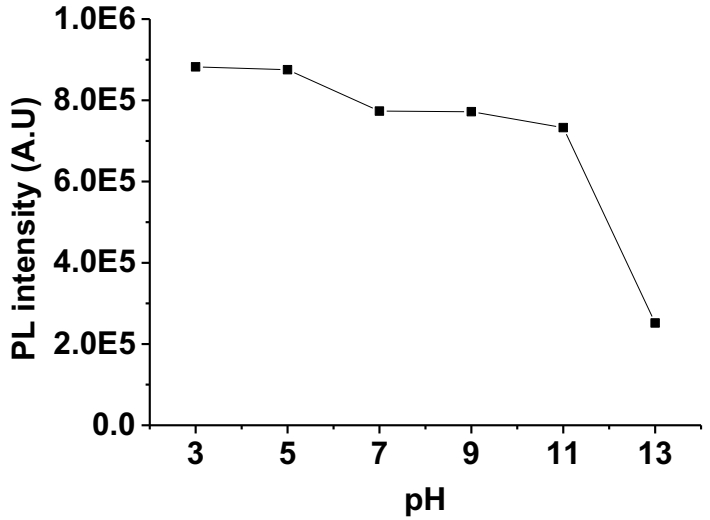
Low cost
Non-toxicity
Biodegradability
Eco-friendly
High stability

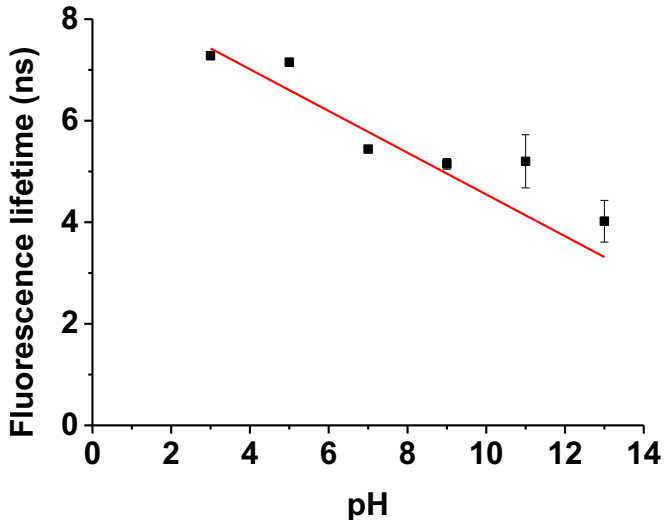


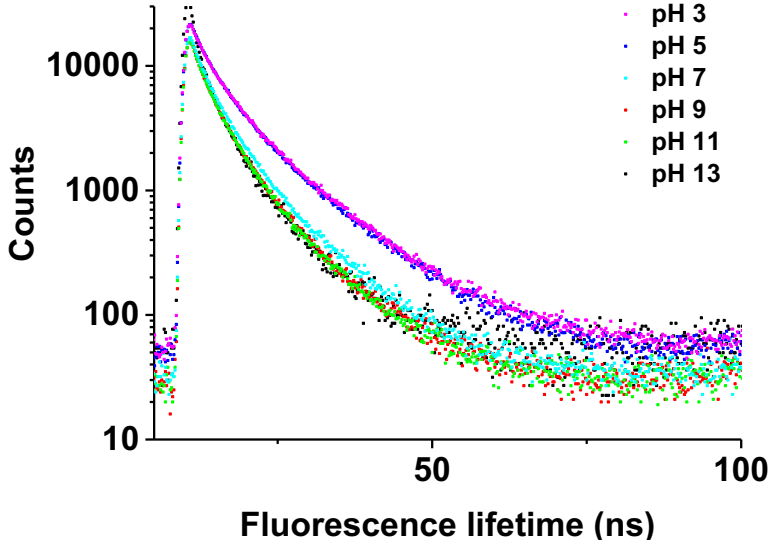
Peilian Shen et al (2016). ChemistrySelect 2016, 1, 1314 – 1317

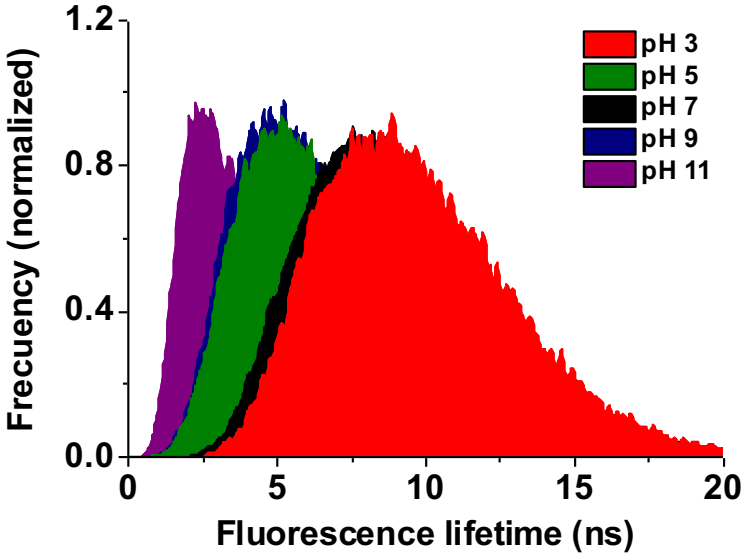
Carbon dots: Sensibilidad al pH



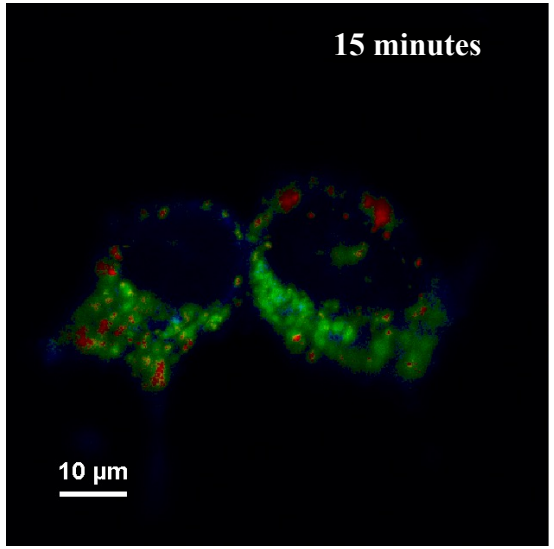


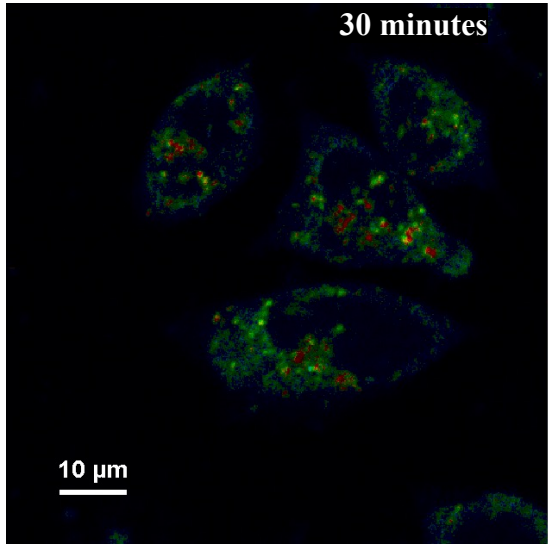


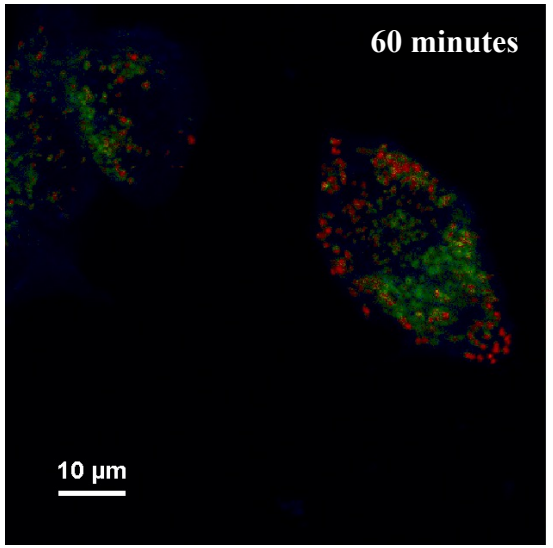


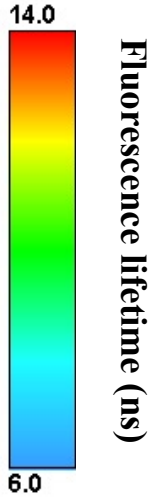


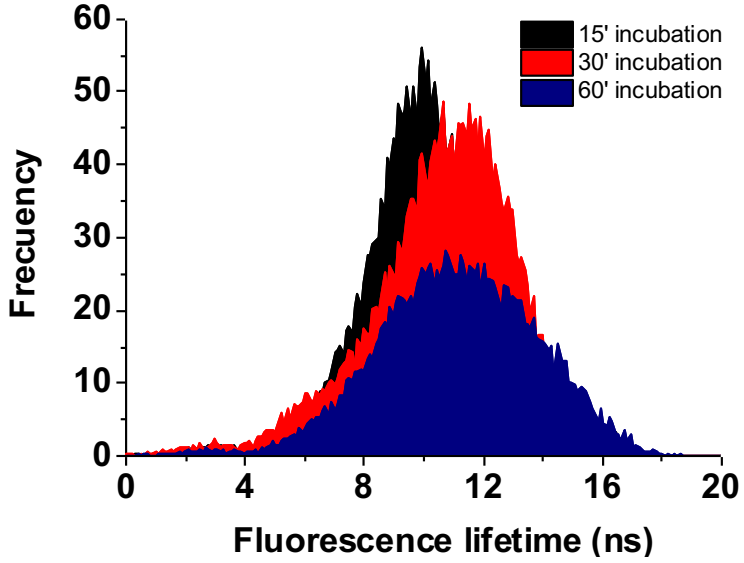
Carbon dots y microscopía FLIM











Gracias por su atención