

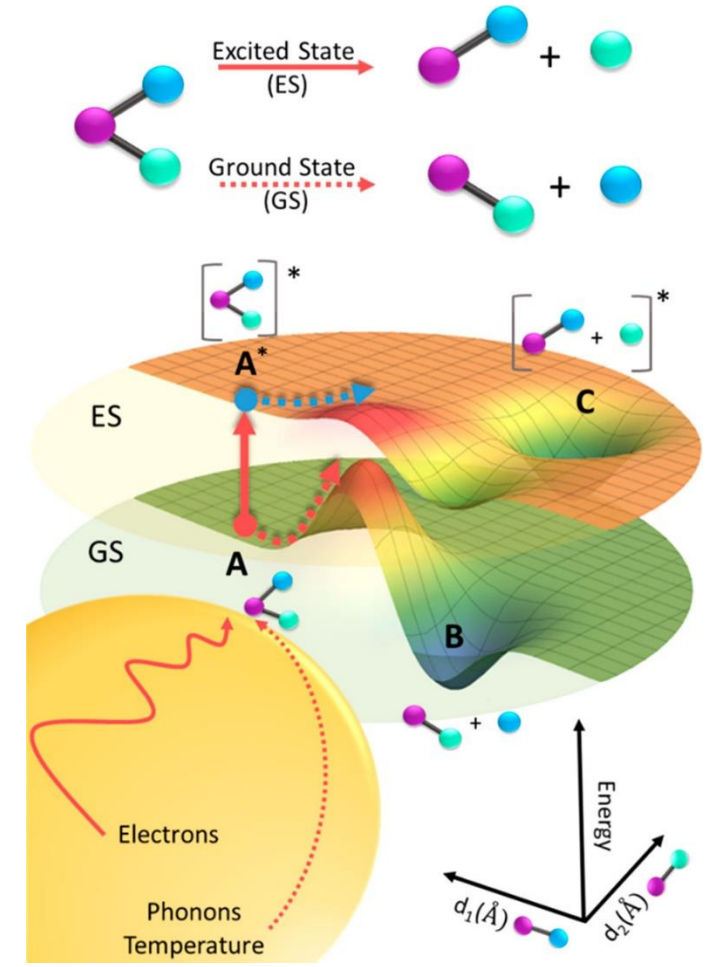
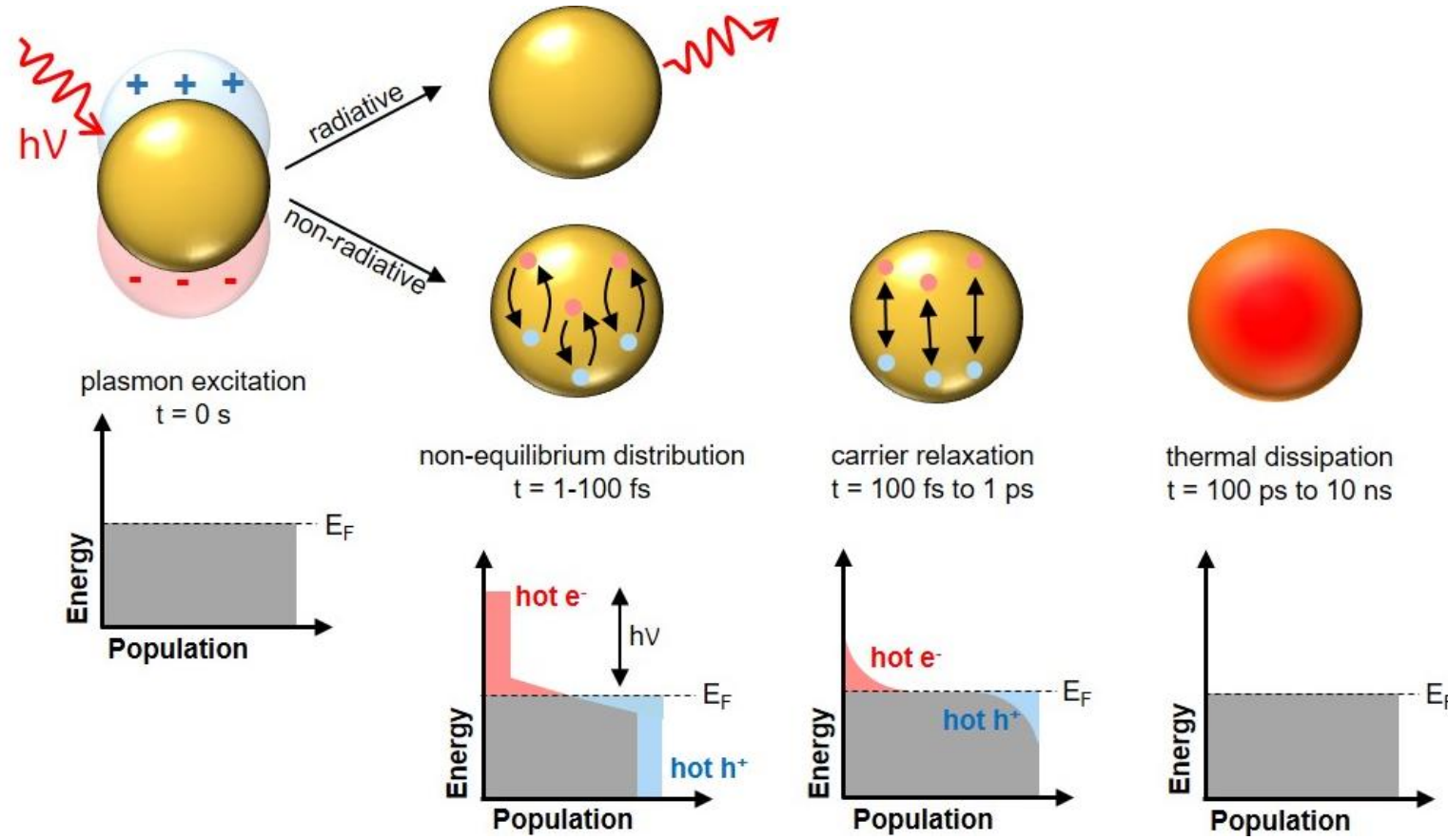


Plasmonic photocatalysis: from fundamental aspects to applications

Miguel Comesaña-Hermo

miguel.comesana-hermo@u-paris.fr

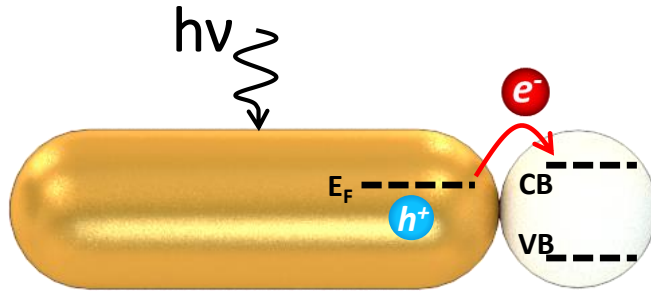
Context: Plasmonic charge carriers



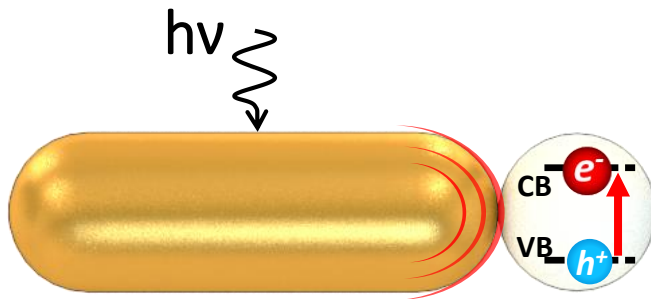
from: *Acc. Chem. Res.*, 2019, 52, 2525

Context: Plasmonic charge carriers

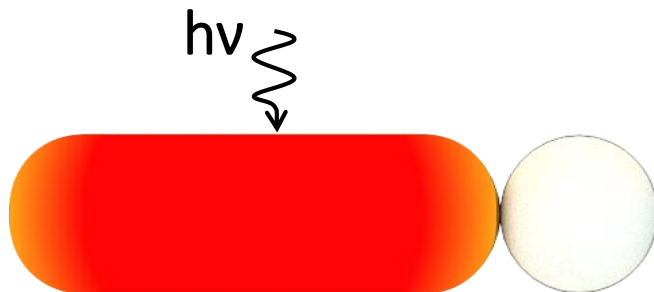
Non-thermalized charge carriers



Near-field enhancement

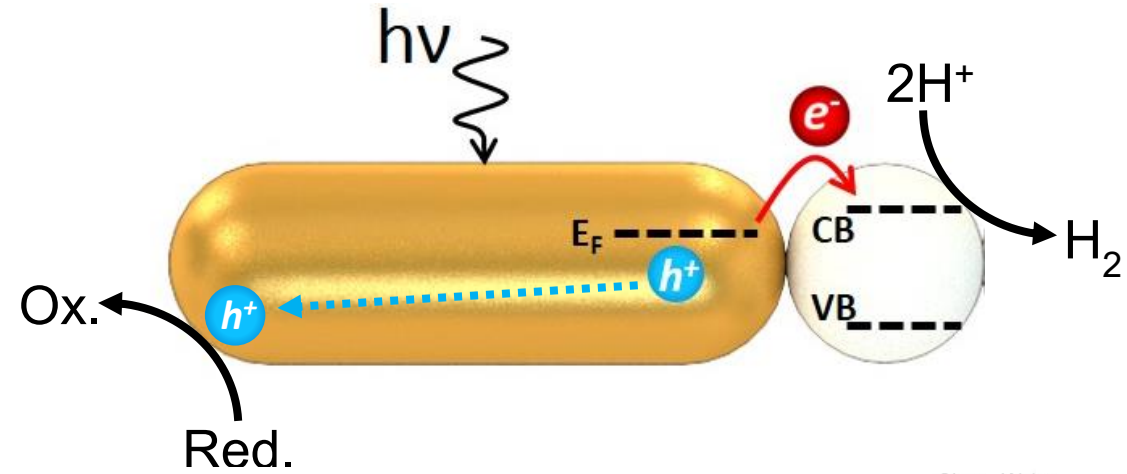
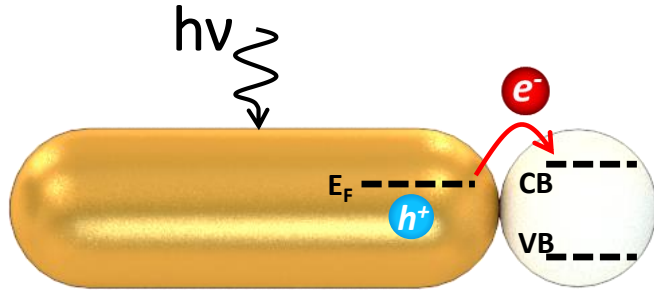


Thermal effects

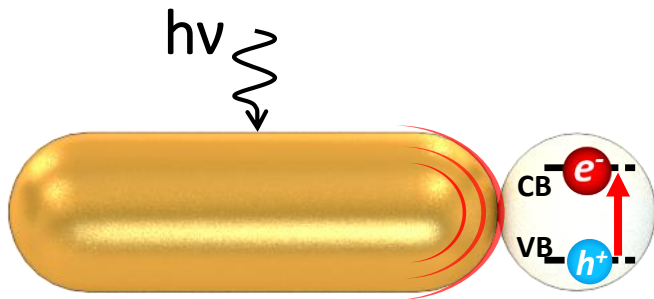


Thermal vs non-thermal mechanisms in plasmonic photocatalysis

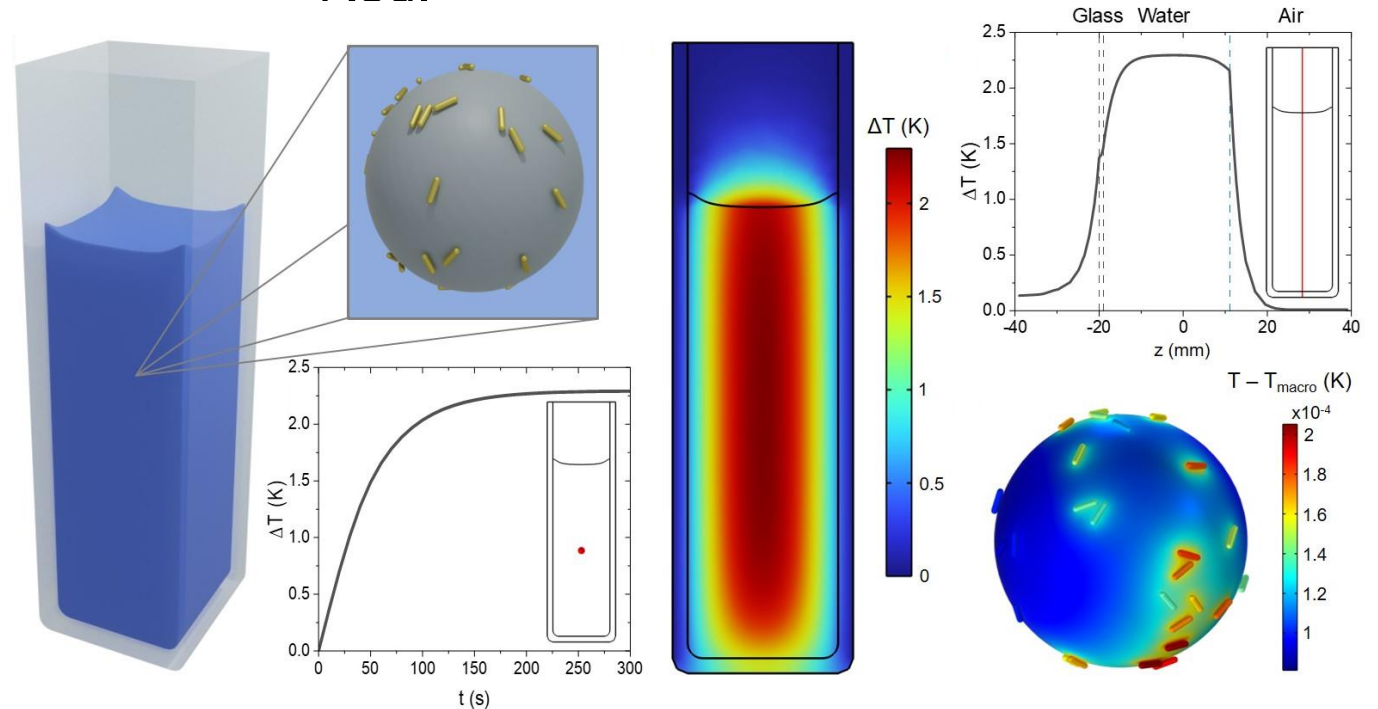
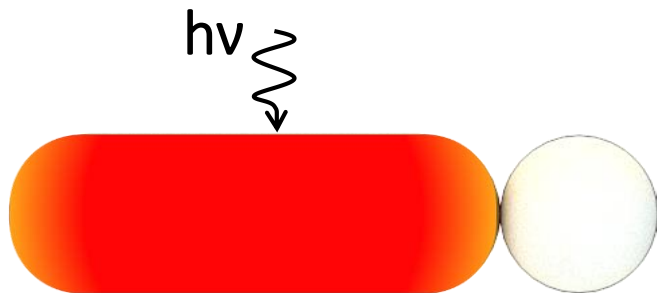
Non-thermalized charge carriers



Near-field enhancement

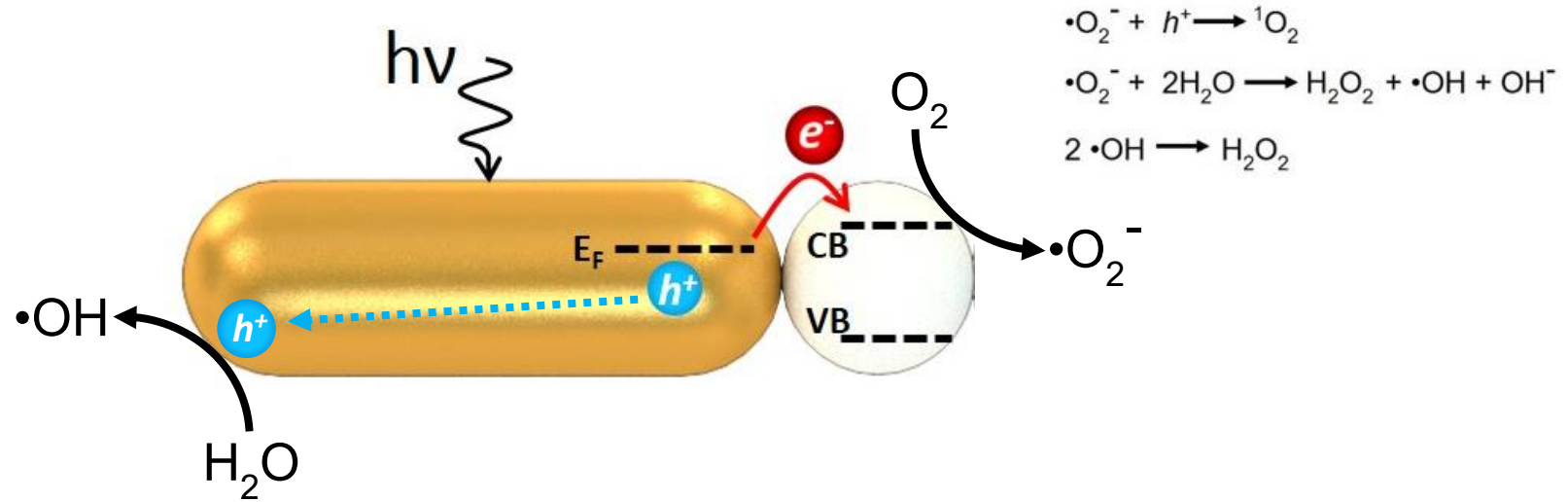
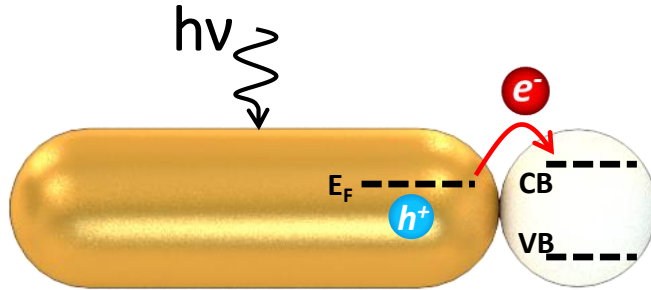


Thermal effects

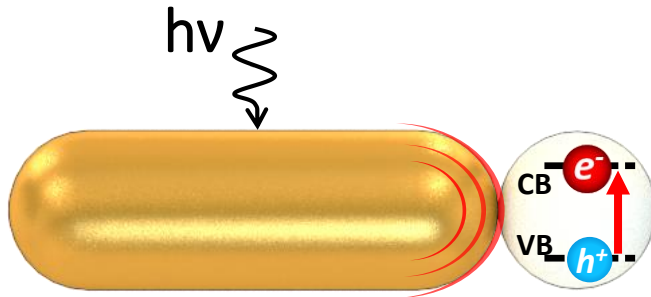


Thermal vs non-thermal mechanisms in plasmonic photocatalysis

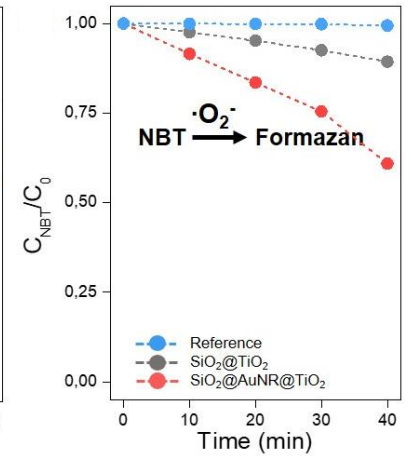
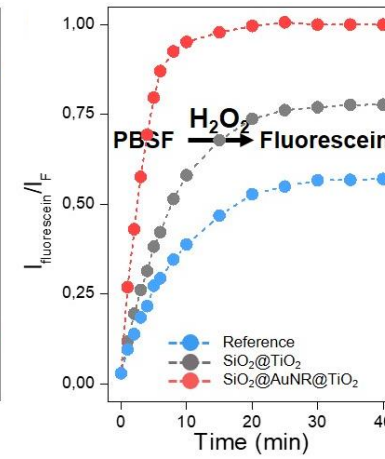
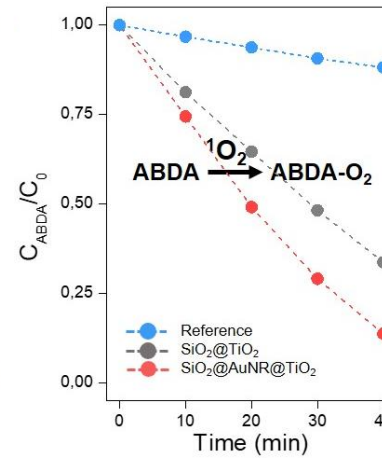
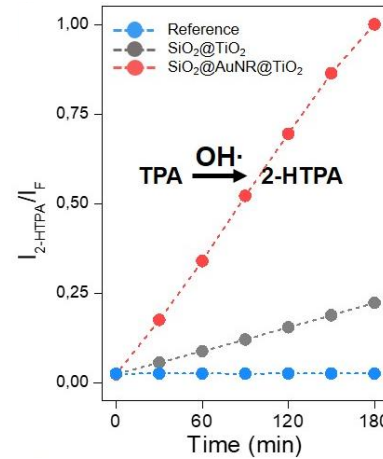
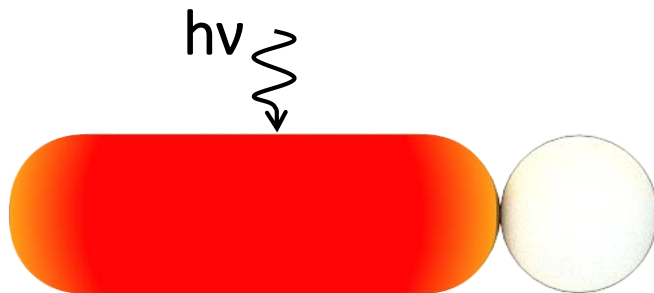
Non-thermalized charge carriers



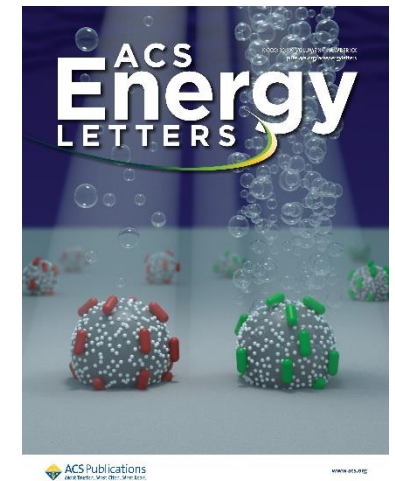
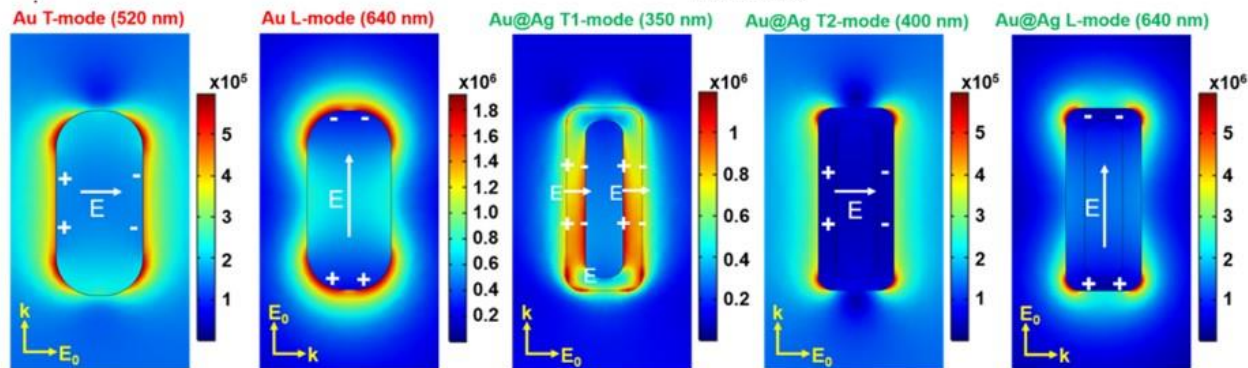
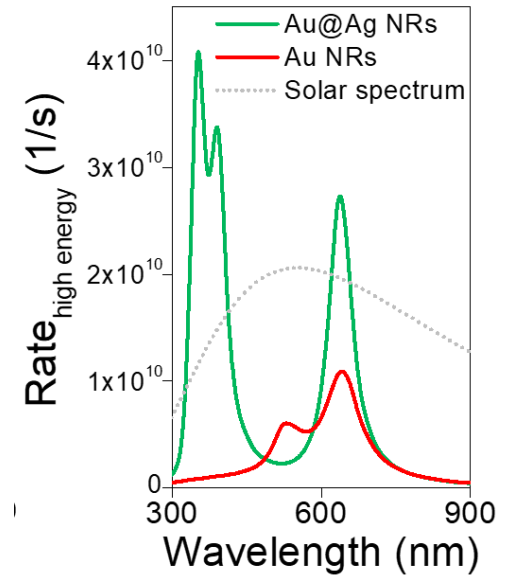
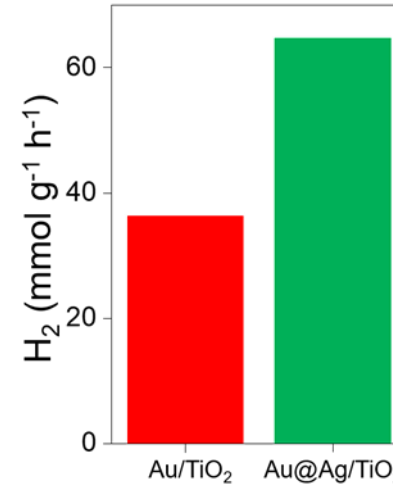
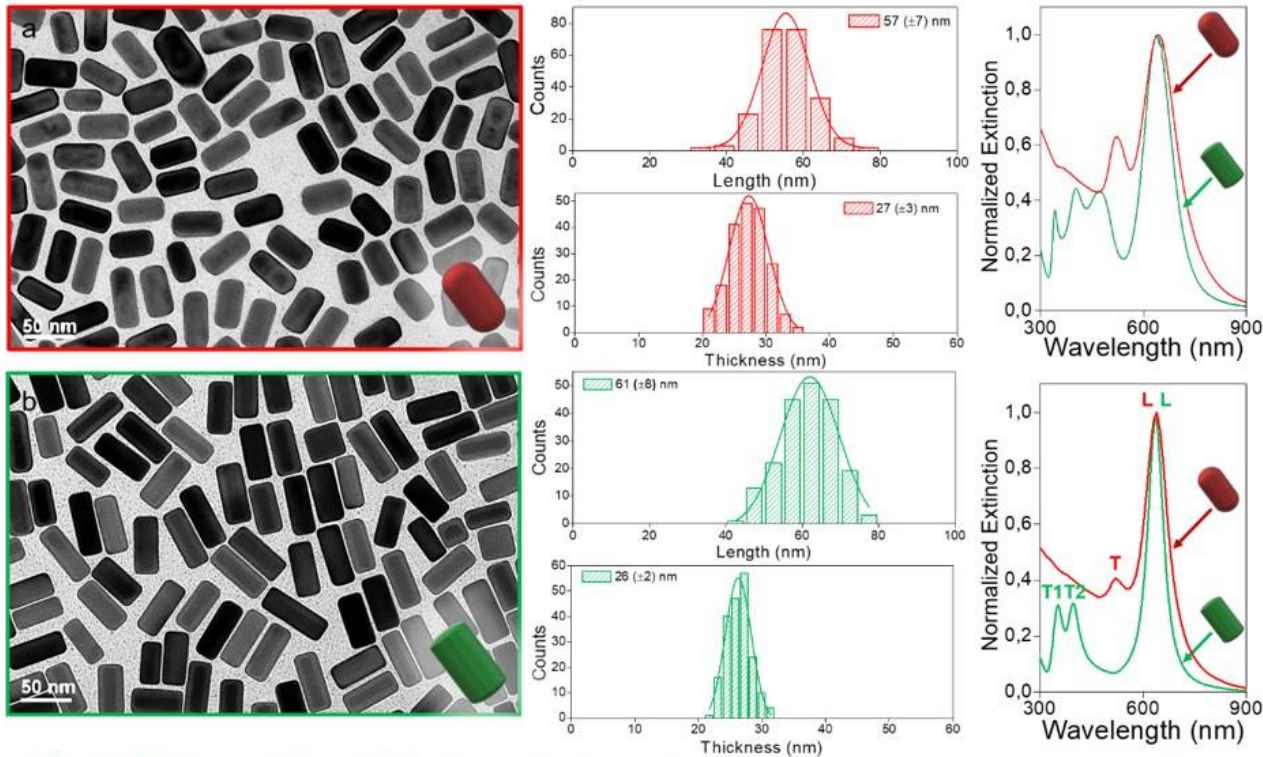
Near-field enhancement



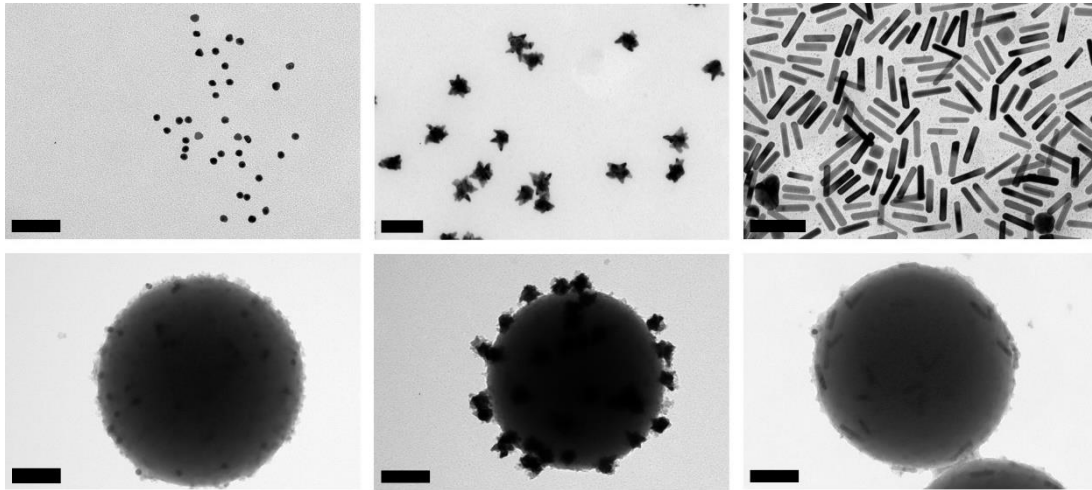
Thermal effects



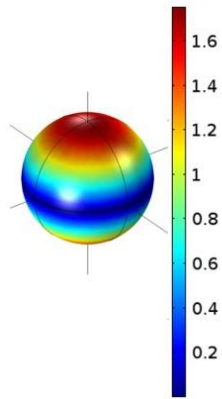
Plasmonic properties: role of morphology and composition



Plasmonic properties: role of morphology and composition

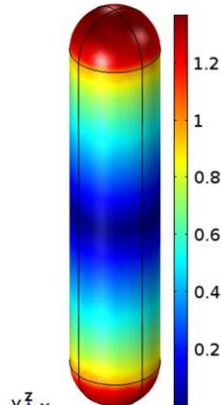


NS, $E||z$, $\lambda_0 = 520$ nm



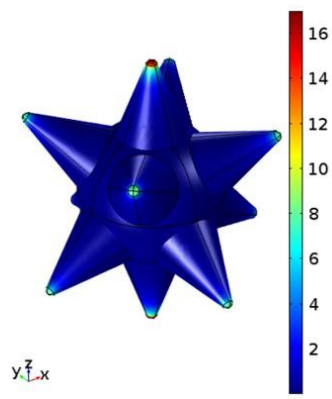
Diameter = 14 nm

NR, $E||z$, $\lambda_0 = 925$ nm

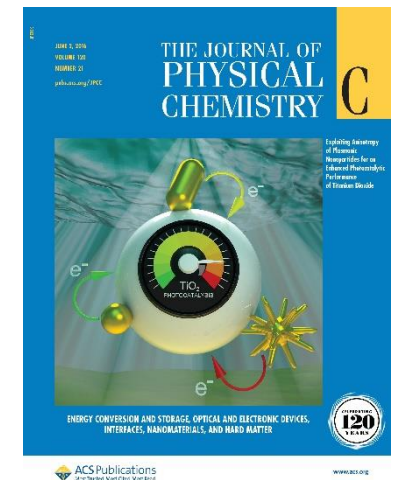
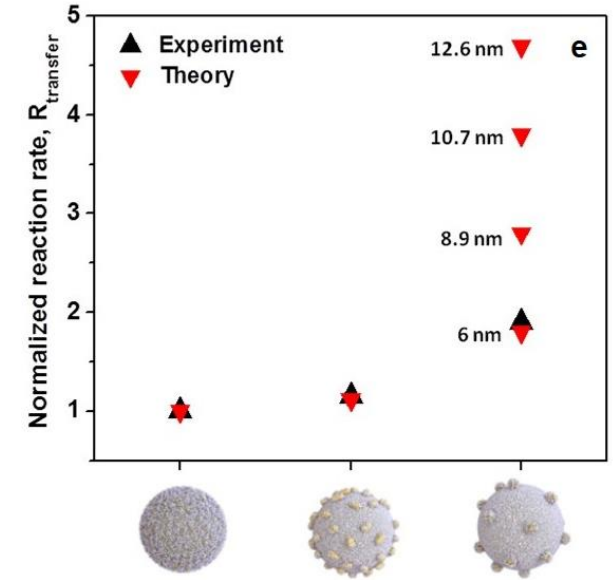
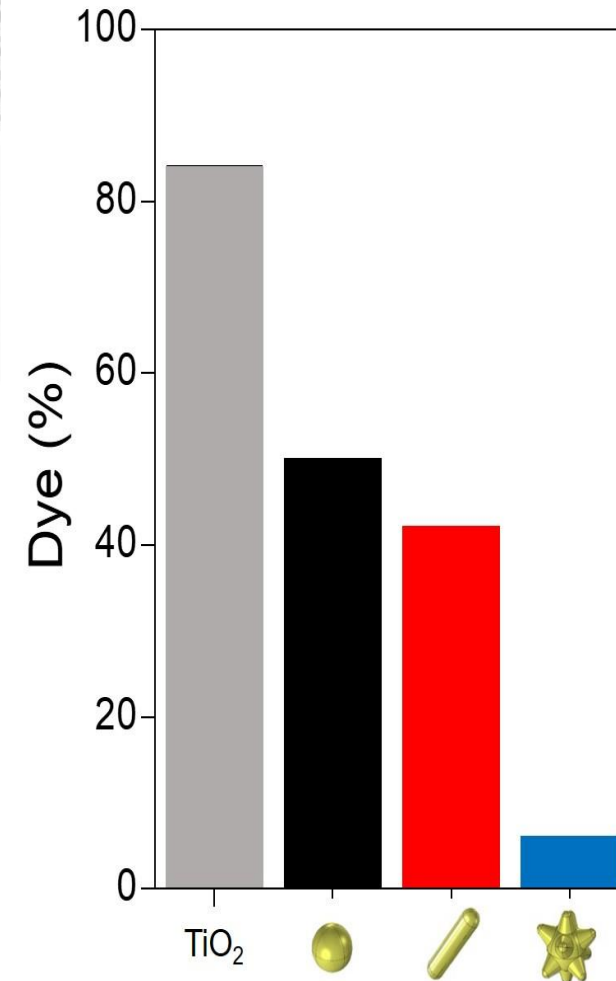


Length = 62 nm
Thickness = 14 nm

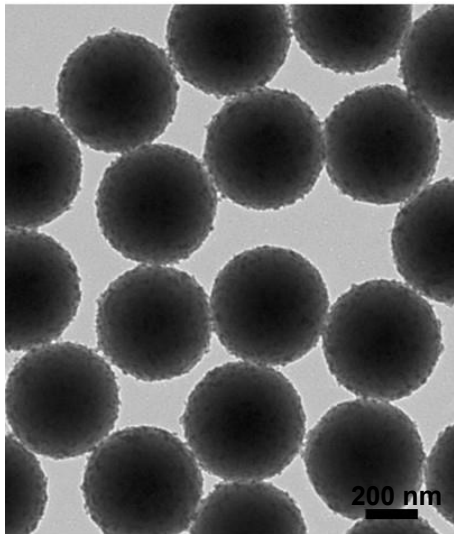
NST, $E||z$, $\lambda_0 = 720$ nm



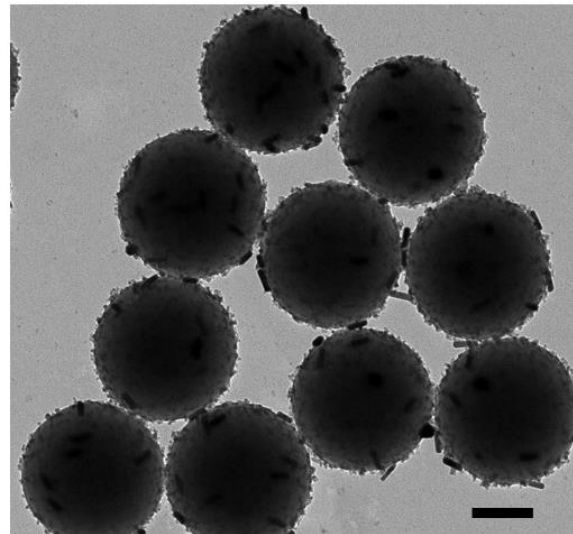
Core diameter = 25 nm
Spike length = 12.6 nm



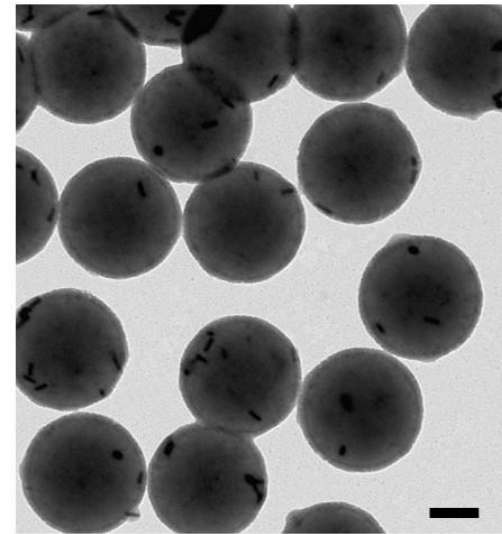
Applications: bio-orthogonal photochemistry



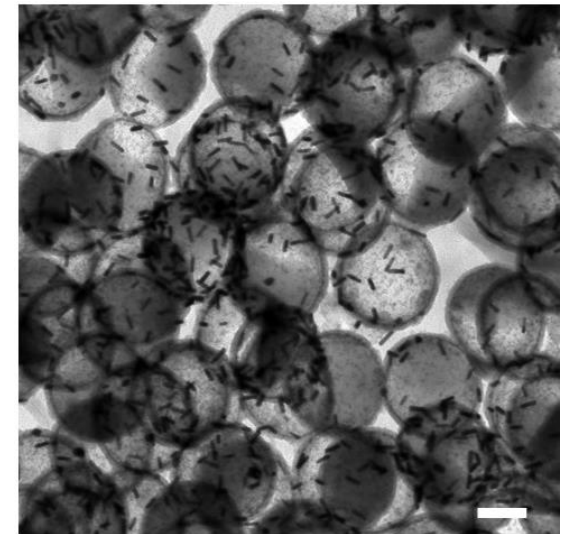
PS@TiO₂



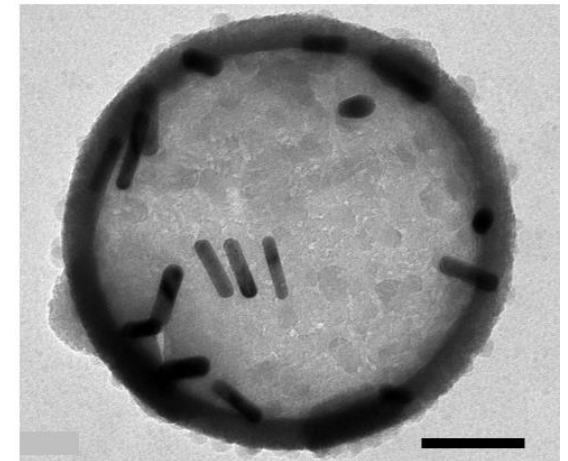
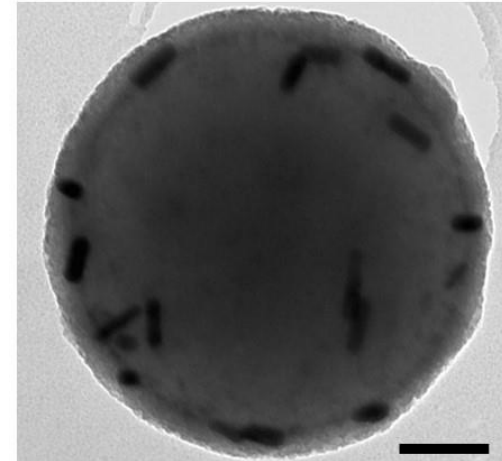
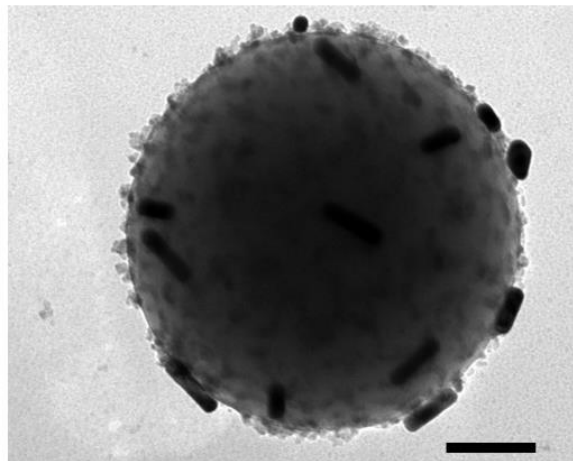
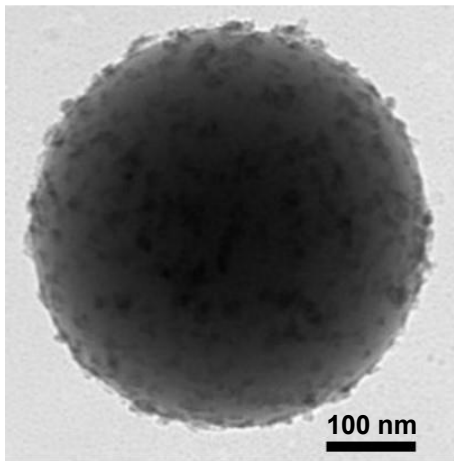
PS@TiO₂@AuNRs



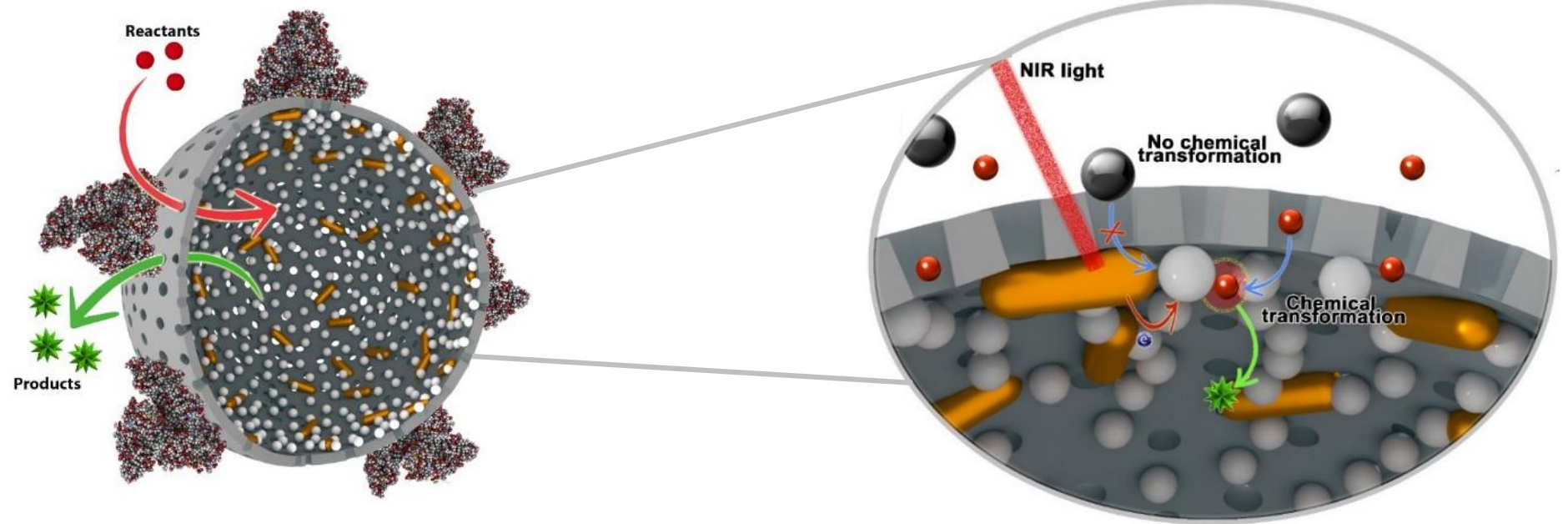
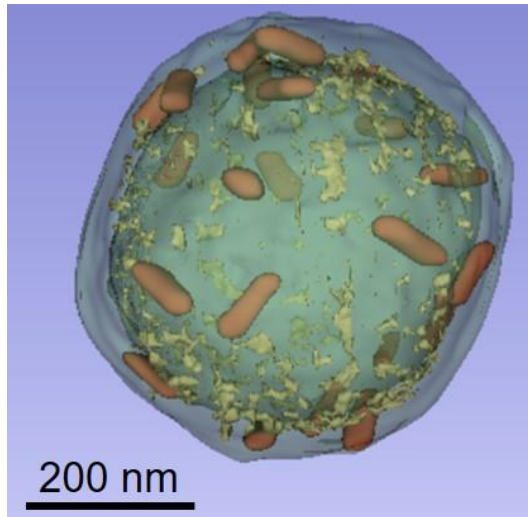
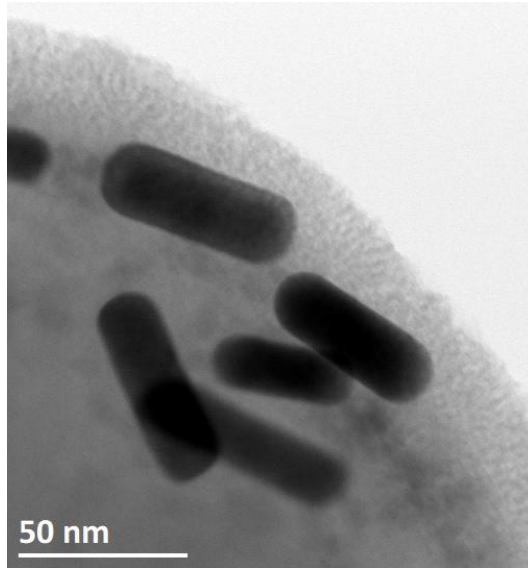
PS@TiO₂@AuNRs@mSiO₂



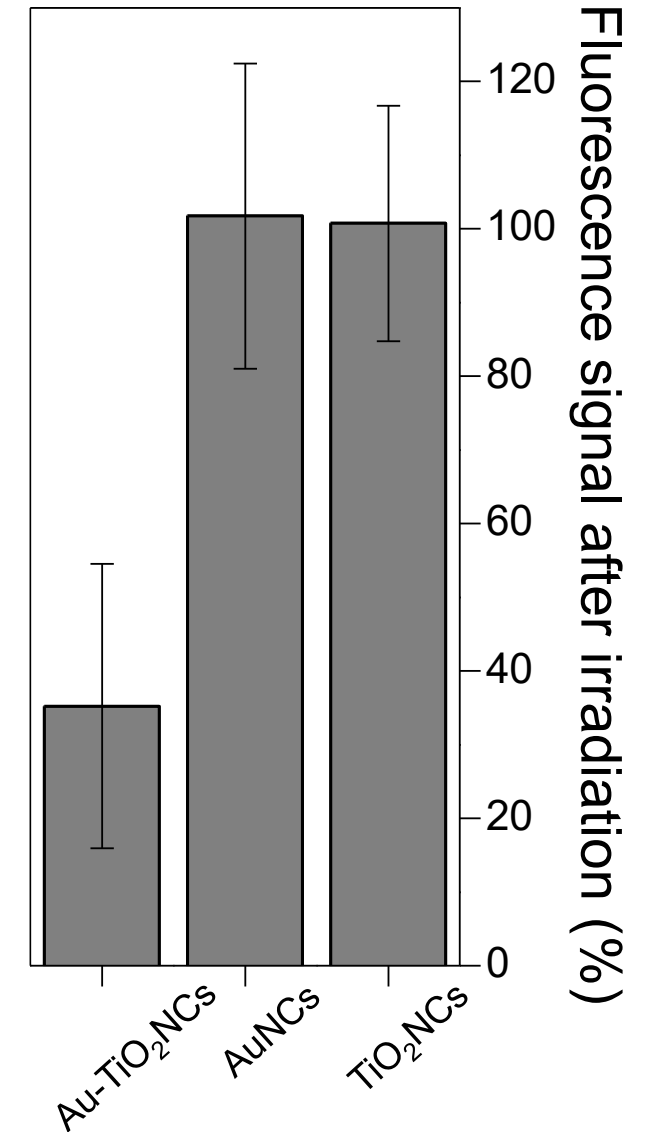
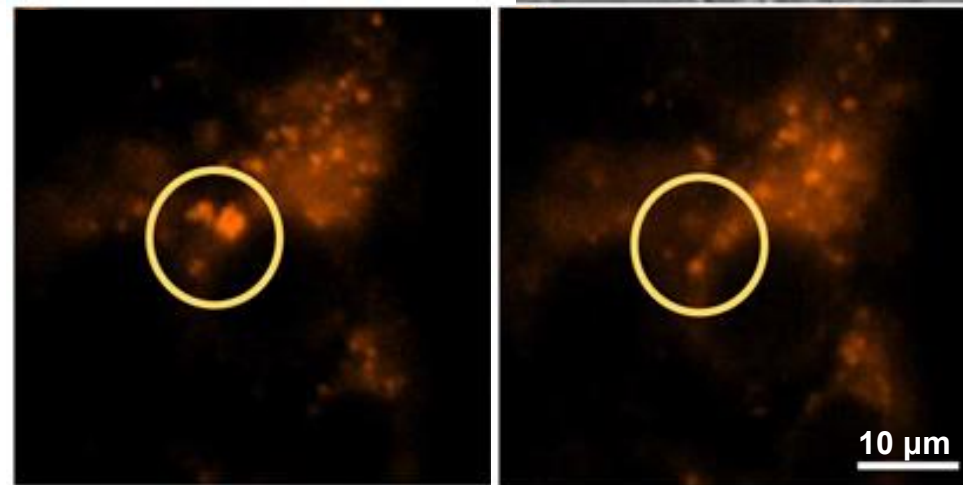
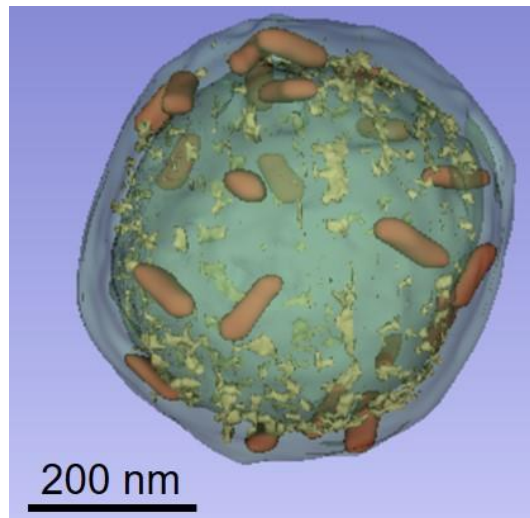
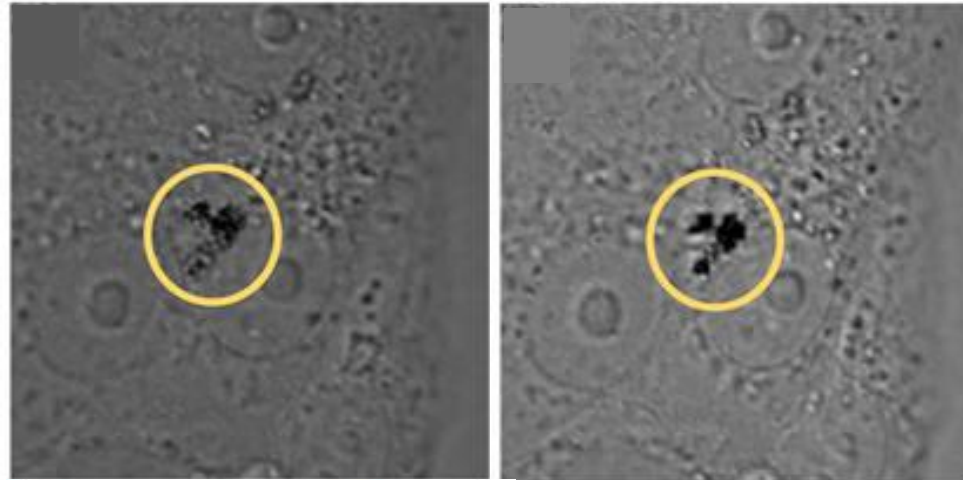
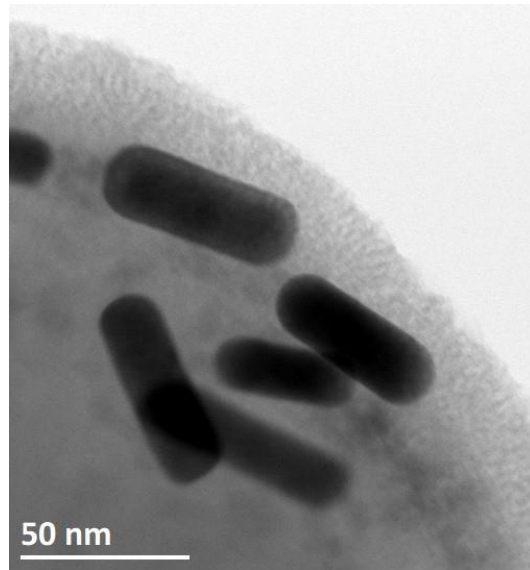
TiO₂@AuNRs@mSiO₂



Applications: bio-orthogonal photochemistry



Applications: bio-orthogonal photochemistry



There is a practical interest for plasmonic photocatalysis?

- Combination with other approaches: (photo)electrocatalysis?
- Implementation in transformations with a high added value
 - Improved selectivity in organic transformations
 - Activation of small molecules: CO₂, H₂O, N₂...
- Search for alternative plasmonic materials
 - MxOy, MxNy, doped QDs...
- Unique light-matter interactions
 - Chirality

Acknowledgements



Ana Sousa



Yoel Negrín



Charlène Brissaud



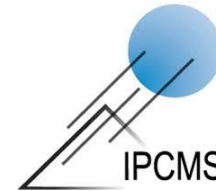
Jean-Yves Piquemal
Wajdi Chaâbani
Marion Giraud
Jennifer Peron
Lorette Sicard

Universidade de Vigo

Miguel A. Correa-Duarte
Lucas Besteiro



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Artur Movsesyan
Xiang-Tian Kong



Ovidiu Ersen
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