

Plasmonic catalysis across all lengths: from 1nm to 1mm

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Green chemicals may shape the society of the future, taking over the role of fossil fuels. However, low-energy synthesis processes need to be discovered for that. Electrocatalysis is probably the most advanced way to try to solve the problem, but we are running out of time and alternative ideas need to urgently boost our path towards sustainability. In this context, plasmonic catalysis emerged more than a decade ago and has increasingly gathered the attention of different communities trying to find new ways of converting energy.

In this talk I will show an overview of our latest results [1-8] towards understanding, designing, predicting and testing different platforms for plasmonic catalysis. From the nanoscopic view point to large-scale platforms, I will show plasmonic catalysis across many different length-scales, ranging from 1nm to 1mm (see Fig.1). Understanding the mechanisms operating in plasmon-to-chemical conversion enables the design of more efficient photocatalysts. This is the starting point and the needed building block for later scaling from nanomaterials to the device scale. Moving from nanometer to millimeter requires also an optimization route and new ideas to overcome, for example, the low penetration-depth of the light in photochemical reactors. All these steps will be discussed along with our new results on large scale plasmon-to-hydrogen production.

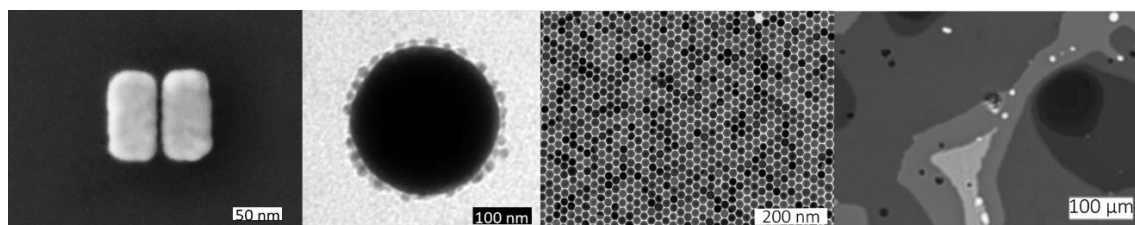


Fig. 1 Plasmonic catalysis across all lengths: nanometer hotspots, nanoparticles, arrays and supercrystals.

References

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