

# PHOTOCONDUCTIVITY MEASUREMENT ON UPCONVERTING PHOTOCATALYSTS FOR H<sub>2</sub> PRODUCTION

**LABORATORY :** Institut Lumière Matière  
**IN COOPERATION WITH :** Institut Lumière et Matière and IRCELYON

**LEVEL :** M2  
**TEAM(S) :** LUMINESCENCE

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**KEYWORD(S) :** upconversion / photocatalysis / photoconductivity

## SCIENTIFIC CONTEXT :

To produce hydrogen from completely carbon-free sources, several solutions are available. Electrolysis of water using electricity generated by renewable means, or photolysis of water using a photocatalyst and light. Here too, the light must be produced by a de-carbonized source. More simply, of course, we can use the sun directly, thus eliminating the need for a conversion step. Unfortunately, the photons useful for photolysis (mostly in the UV) represent only a small portion of the total photons received from the sun through the atmosphere.

In the frame of the ANR project UPH2 we aim to develop new photocatalysts for water dissociation that directly incorporate light conversion functionality by adding photons (up-conversion) to make the most of the solar spectrum.

To this end, we will study a family of rare-earth-doped oxysulfides, which enable up-conversion within the photocatalyst structure itself and developed at IRCELYON. One key parameter for a photocatalyst is the ability to generate and separate charges when illuminated. This process can be monitored by Microwave Resonant Cavity Technique (MRCT).

## MISSIONS :

We propose an M2 internship (6 months) in the frame of this project. The intern will have to work on the MRCT existing setup in order to improve its performance and allow the detection of fast signals (~ns) of photoionization and recombination of the free carriers and to study the samples synthesized in the frame of the collaboration and interpret the results.

The candidate is required to have very good grades and strong knowledge in the domain of physics and in particular optics and/or materials science as well as being interested and curious to work in interdisciplinary research. Being autonomous in work organization and time management, and good English language skills are strongly suggested.

## OUTLOOKS :

The internship could potentially lead to a PhD thesis, funded by the ANR