

**3 years PhD position in ultrafast femtosecond laser spectroscopy of heterogeneous solid photoactive catalysts for the conversion of methane**

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The conversion of the molecule of methane ( $\text{CH}_4$ ) into value-added chemical products and fuels, such as olefins or aromatics is a process of great interest towards a more sustainable and decarbonated industry [1]. However, because of the high stability of the C-H bond, the conversion must be activated at high temperature, resulting in high energetic cost and poor selectivity. The objective of the PhD thesis is to investigate by **femtosecond time-resolved spectroscopy** the primary chemical steps that govern the **photo-conversion** of methane at the surface of novel  $\text{TiO}_2$  [2] and metal-zeolite [3,4] based photocatalysts. This PhD thesis is part of the **PulseCoMeth project** funded by the French National Research Agency (ANR) and gathering 4 French laboratories LASIRE, UCCS, LCS and IPR with complementary expertise in the field of ultrafast transient spectroscopy, photochemistry and photoscience, catalysis, nanoporous material chemistry and engineering.

For this project, you will investigate the photo-induced processes in **new solids states photocatalysts**, developed by the partners UCCS and LCS, by performing femtosecond UV-vis and Mid IR transient absorption measurements with the experimental facilities available in LASIRE. You will also have the opportunity to participate to time-resolved X-ray experiments with the IPR group involved in the project. Your ultimate goal will be to optimize the efficiency and selectivity of the photoconversion of methane thanks to the control of the synergy between the composition and the chemical function of the catalytic materials and the photodynamics of the ultrafast processes governing the light-to-chemical energy conversion.

The ideal candidate will preferentially have:

- a master degree in physical-chemistry with specific knowledge in photochemistry, optical spectroscopy or light-matter interaction, or material chemistry and (photo)catalysis. A prior experience in ultrafast laser spectroscopy will be appreciated but is not mandatory.
- a strong interest for the experimental work and the data analysis, the interdisciplinary and collaboration

The position is funded for **36 months** by CNRS ([www.cnrs.fr](http://www.cnrs.fr))

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Application webpage: <https://emploi.cnrs.fr/Offres/Doctorant/UMR8516-VINDEW-001/Default.aspx>

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