



## *Post-Doc position in ultrafast multi-pulse spectroscopy of molecular systems designed for sustainable energy production*

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Molecular systems designed for photo-voltaics or photo-catalytic hydrogen production have emerged over the last twenty years. On the search for an optimal photon-to-energy conversion efficiency, ultrafast spectroscopy provides an atomic-scale understanding of the molecular mechanisms at play (e.g. charge transfer)[1]. The standard approach of UV/VIS femtosecond transient absorption or fluorescence spectroscopy has recently been complemented by multi-pulse experiments, such as two-dimensional electronic (2DES)[2] or vibrational spectroscopy, or excited state impulsive vibrational spectroscopy (pump-IVS)[3], with sub-20fs time resolution.

In our lab, we have been developing these techniques with blue/near-UV sub-10 fs pump pulses[4]. However further work is still needed to make the set-up fully operational for ultrafast spectroscopy of molecules in the condensed phase. A particular focus in our team are molecular systems designed for **sustainable energy production**.

Thanks to long-standing collaborations with synthetic chemists in French and German partner labs, the systems we target include, and are not limited to

- Metalorganic Fe-NHC complexes[5], and metalorganic Fe-Co dyads for photo-catalytic proton reduction ( $H_2$  production)[6].
- Transparent dye-sensitized solar cells based on near-IR absorbing cyanine and DPP-based chromophores[7].

### JOB DESCRIPTION:

The 2-years post-doc position is located in the ultrafast spectroscopy lab at the Institute of Physics and Chemistry of Materials Strasbourg (IPCMS-DON, Dr. J. Léonard & Pr. S. Haacke). Besides the above described functional molecular systems, our group studies the femtosecond photo-chemistry of biomolecules[8]. For an overview of our current research see [here](#).

The first year of the post-doc position will be devoted to up-grading the 2DES set-up by the use of a *Dazzler* pulse shaper (FastLite, Inc.). After a thorough characterization phase, you will use the set-up for new experiments on the above molecular systems, with the aim of exploring e.g. the excitation wavelength dependence of the functional photo-reactions. You will nurture these project with your own new research ideas and be at the forefront of exchange with the chemistry partners. The synergy with the chemists is key to the development of molecular materials with improved photo-sensitizing properties.

Besides, the early career scientist will independently pursue, publish outstanding papers and publicize his work at conferences, mentor graduate students, and participate in fundraising efforts.

This new project builds on our previous results [4,7,9], with the next challenge being to apply to 2DES and pump-IVS for the first time to above molecular systems.

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[2] F.D. Fuller et al., *Annu. Rev. Phys. Chem.* 66 (2015) 667–690. doi: 10.1146/annurev-physchem-040513-103623.  
[3] T. Buckup et al., *Annu. Rev. Phys. Chem.* 65 (2015) 39–57.  
[4] M. Gueye et al., *Rev. Sci. Instrum.* 87 (2016) 093109. doi: 10.1063/1.4962699.  
[5] L. Lindh et al., *Catalysts* 10 (2020) 315. doi: 10.3390/catal10030315.  
[6] P. Zimmer et al., *Eur. J. Inorg. Chem.* 2017 (2017) 1504–1509. doi: 10.1002/ejic.201700064.  
[7] W. Naim et al., *JACS Au* 1 (2021) 409–426. doi: 10.1021/jacsau.1c00045.  
[8] D. Agathangelou et al., (2021) 29. doi: <https://doi.org/10.5802/crphys.41>.  
[9] K. Magra et al., *J. Phys. Chem. C* 124 (2020) 18379–18389. doi: 10.1021/acs.jpcc.0c03638.



#### MINIMUM QUALIFICATIONS

Doctoral Degree in a related field (Physics, Chemistry, Photonics) and demonstrated research ability. Preferred applicants should have a strong background in ultrafast optics and spectroscopy, ideally applied to molecular systems in the condensed phase. We like to work with team players and young enthusiastic scientists attracted by a broad interdisciplinary horizon, and an international collaboration.

**Starting date:** ASAP.

Applicants should send a CV and Cover Letter briefly summarizing previous expertise and current/future interests. **Informal inquiries** can be sent to [haacke@unistra.fr](mailto:haacke@unistra.fr) or [jeremie.leonard@ipcms.unistra.fr](mailto:jeremie.leonard@ipcms.unistra.fr). For **general questions**, please contact Ms. Catherine Bonnin (+33 3 8810 7141) from human resources.

The Centre National de la Recherche Scientifique (CNRS) is committed to increasing the number of individuals with disabilities in its workforce and therefore encourages applications from such qualified individuals. The CNRS strives for gender and diversity equality. We welcome applications from all backgrounds.