Dr. Ahmed MAHJOUB

Post-doc

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PhD in Physical chemistry

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Education:

October 2009:

Phd thesis in experimental and theoretical molecular spectroscopy at Laboratoire de Photo-Physique Moléculaire (Université Paris-11).

Phd Supervisor : Dr Anne Zehnacker (anne.zehnacker-rentien@u-psud.fr).

PhD title: Enantioselective processes in hydrogen bonded complexes

Spectroscopic study of gas phase complexes between chiral molecules formed in supersonic jet. IR-UV and REMPI spectroscopy used to understand molecular interaction responsible for chiral discrimination. Experimental results are compared to quantum chemical calculations in order to learn more about configurational differences between complexes involving different enantiomers of chiral molecule.

Keywords: Resonante Enhanced Multiphonton Ionisation (REMPI); TOF-Mass Spectroscopy ; Supersonique jet; Hydrogen-bended complexes; IR/UV double resonance spectroscopy; Chiral discrimination; Laser Induced Fluorescence; Theoretical calculation.

2005/2006 :

Master's degree in molecular physical chemistry at Université Paris 11, an international Fellowship has been awarded. Followed by training at Laboratoire de photophysique moléculaire Université Paris 11.

A level passed with honors.

2003-2005 :

Bachelor in fundamental and applied physics at Ecole Normal Supérieure de Tunis (ENS).

Research experience:

My research activities fall mainly on two complementary themes:

- The molecular spectroscopy (PhD dissertation and one year teaching-as-Research fellow)

- Laboratory simulation of planetary atmospheres and surfaces: A postdoc at NASA-JPL laboratory with Caltech fellowship, Two post-doc in the same laboratory (LATMOS): UVSQ fellowship (2 years) and Paris 12 fellowship (1 year).

Appointments:

From October 2009 to October 2010 : Teaching-as-Research Fellow: (1 year position) at Institut Galilée (Paris 13 University).

Advisor: Pr. Majdi Hochlaf (hochlaf@univ-mlv.fr)

Research topic: Study of DNA bases analogues in the ionized state by Slow Photoelectron Spectroscopy.

January 2011-Septembre 2012 (UVSQ fellowship):

Post-doctorate at LATMOS (Laboratory of Atmospheres, and Space Observations)

- Advisor: Dr. Nathalie Carrasco (nathalie.carrasco@latmos.ipsl.fr)

* Research topic: Optical and chemical proprieties of Titan aerosols analogues produced at cryogenic temperature:

September 2012-September 2013: (Paris 12 fellowship)

Advisor: Dr. Nathalie Carrasco and Dr. Martin Schwell.

Research topic: Simulation of Titan's atmospheric chemistry and analysis of Titan's aerosols analogues by 2-steps Laser Desorption Ionization Spectroscopy (L2DI).

Current position: post-doc is at NASA-JPL laboratory (Caltech fellowship)

Advisor: Dr. Mathieu Choukroun and Jordana Blackesberg.

Research topics:

1- Chemical and spectroscopic characterization of laboratories analogues of outer solar system ices: application to the origin of Jupiter Trojans

2- Experimental simulation of Titan's hydrocarbon lakes.

1- Refereed journal articles

1) "Electron irradiation and thermal processing of ices analogues of outer solar system objects: CH_3OH NH_3-H_2S-H_2O and CH_3OH-NH_3-H_2O system".

A. Mahjoub, M. Poston, K. Hand, R. Hodyss, M. Choukroun, B. Ehlman, J. Blackesberg, John Eiler. In preparation.

2) "Evolution of Titan's atmospheric aerosol under high-altitude ultraviolet irradiation".

N. Carrasco, **A. Mahjoub**, B. Fleury, G. Cernogora, L. Nahon, P. Pernot, M. Gudipati. PNAS, submitted.

3) "Influence of CO on Titan atmospheric reactivity".

B. Fleury, N. Carrasco **A. Mahjoub**, T. Gautier, He J., Szopa C., E. Hadamcik, A. Buch, G. Cernogora. Icarus, 238, 221-229 .

4) "Effect of synthesis temperature on the optical indices of organic materials produced by N_2-CH_4 RF plasma"
A. Mahjoub, N. Carrasco, P-R. Dahoo, Benjmin Fleury, T. Gautier, G. Cernogora, *Plasma Processes and Polymers,2014*

5) "Substituent effects on vibrational and electronic excitation spectra of pyridone tautomers and ions: The case of the cyano group"

M. Ben Messaouda, **A. Mahjoub**, M. Morgen Al-Morgen, M. Abderrabba, M. Hochlaf, Journal of Molecular Structure, 2014, 1074, 422-428.

6) "Theoretical studies of 2-quinolinol: Geometries, vibrational frequencies, isomerization, tautomerism, and excited states"
Y. Pan, L. Kai-Chung, M. Morgen Al-Morgen, **A. Mahjoub**, M. Hochlaf. Chemical Physics Letters, 2014, 613, 29-33.

7) "Ionization photophysics and spectroscopy of cyanoacetylene"
S. Leach, G. A.Garcia, **A. Mahjoub**, Y. Bénilan, N. Fray, M-C. Gazeau, F. Gaie-Levrel, N. Champion, M. Schwell, *The Journal of Chemical Physics, 140, 174305.*

8) "Optical properties of analogs of Titan's aerosols produced by dusty plasma"
E. Hadamcik, J.B. Renard, **A. Mahjoub**, T. Gautier, N. Carrasco, G. Cernogora, Szopa C. *Earth Planets and Space* (2013), 65 (10), pages: 1175-1184.

9) “Structure rearrangement in the formation of jet cooled complexes of chiral (S) 1,2,3,4-tetrahydro- 3-isoquinoline methanol with methyl-lactate: chirality effect in conformer selection”

A. Mahjoub, K. Le Barbus-Debus, A. Zehnacker, *The Journal of Physical Chemistry A (2013),* 117, pages: 2952-2960.

10) “Use of the linear absorption coefficient for absolute comparison of plasma films in the mid-IR range”

T. Gautier, N. Carrasco, **A. Mahjoub**, I. Stefanovic, C. Szopa, G. Cernogora, E. Hadamcik, J. Winter Problems of Atomic Science and Technology, 1 (83) (2013) 168-170

11) “Titan's atmosphere simulation experiment using continuous UV-VUV synchrotron radiation"

Z. Peng, T. Gautier, N. Carrasco, P. Pernot, A. Giuliani**, A. Mahjoub**, J-J. Correia, A. Buch, Y. Bénilan, C. Szopa, and . Cernogora, *Journal of Geophysical Research E* (2013) 118, pages: 778-788.

12) “Influence of methane concentration on the optical indices of Titan’s aerosols analogues”

A. Mahjoub, N. Carrasco, P-R. Dahoo, T. Gautier, C. Szopa, G. Cernogora, (2012). *Icarus*, 221, pages: 670 677.

13) “Mid- and far-infrared absorption spectroscopy of Titan's aerosols analogues”.

T. Gautier, N. Carrasco, **A. Mahjoub**, S. Vinatier, A. Giuliani, C. Szopa, C.M. Anderson, J.J. Correia, P. Dumas and G. Cernogora, (2012). *Icarus*, 221, pages: 320-327.

14) “State-Selected Unimolecular Decomposition of γ-Valerolactam+ and γ- Valerolactam$_2$ + Cations: Theory and Experiment”

A. Mahjoub, M. Hochlaf, G. A. Garcia, N. Laurent, and L. Poisson; (2012). *The Journal of Physical Chemistry A*, 116 (34), pages: 8706-8712.

15) “Structure and Spectroscopy of Methyl Substituted 2-Pyridone, of their Tautomers and Cations”.

M. Ben Massouda, M. Abedrrabou**, A. Mahjoub**, G. Chambaud, M. Hochalf; (2012).*Computational and theoretical chemistry*. 990, pages: 94-99.

16) “Slow Photoelectron Spectroscopy of δ-Valerolactam and Its Dimer”.

A. Mahjoub, M. Hochlaf, L. Poisson, N. Nieuwjaer, F. Lecomte, J.P. Schermann, G. Grégoire, B. Manil, G. A. Garcia, L. Nahon; (2011). *ChemPhysChem*. 12, pages: 1822-1832.

17) “The role of conformational isomerism in solvent mediated charge transfer in chiral (S) 1,2,3,4-tetrahydro-3-isoquinoline methanol (THIQM): Condensed phase to jet cooled spectroscopic studies”.

A. Chakraborty, N. Guchhait, K. Le Barbu-Debus, **A. Mahjoub**, V. Lepère and A. Zehnacker- Rentien; (2010). *The Journal of Physical Chemistry A*. 115, pages: 9354-9364.

18) “Chirality influence on the aggregation of methyl mandelate”.

M. Albrecht, A. Borba, K. Le Barbu-Debus, B. Dittrich, R. Fausto, S. Grimme, A. **Mahjoub**, M. Nedić, U. Schmitt, L. Schrader, M. A. Suhm, A. Zehnacker-Rentien and J. Zischang; (2010). *New Journal of Chemistry*. 34, pages: 1266-1275.

19) “Chirality-dependent hydrogen bond direction in jet-cooled (S) 1,2,3,4- tetrahydro-3-isoquinolinemethanol (THIQM): IR-ion dip vibrational spectroscopy of the neutral and the ion”.
A. Mahjoub, A. Chakraborty, V. Lepere, K. Le Barbu-Debus, N. Guchhait, A. Zehnacker; (2009). *Physical Chemistry Chemical Physics*. 11, pages: 5160-5169.
20) “Chiral recognition in jet-cooled complexes of (1R,2S)-(+)-cis-1-amino-2-indanol and methyllactate: on the importance of the CH…π interaction”.
K. Le Barbu-Debus, M. Broquier, **A. Mahjoub** , Zehnacker-Rentien A.; (2009). *Physical Chemistry Chemical Physics*. 11, pages: 7589-7598.
21) “Chiral recognition between alpha- hydroxyl-esters: a double resonance IR/UV study of the complexes of methyl mandelate with methyl glycolate and methyl lactate”
K. Le Barbu-Debus, M. Broquier, **A. Mahjoub**, A. Zehnacker-Rentien; (2008). *The Journal of Physical Chemistry A*. 112, pages: 9731-9741.
22) “IR-UV double resonance spectroscopy of hydrogen bonded complexes”.
A. Mahjoub, K. Le Barbus-Debus, A. Zehnacker;(2007). *Fundamental and applied spectroscopy* , 935, pages: 208-211.

Selected Communications

1- “Thermal and electron processing of outer solar system ices simulants: Chemical and spectroscopic laboratory characterization”, DPS meeting 2014.

2- “Chemical and optical characterization of Titan’s aerosols analogues produced by RF plasma”, JPL NASA Center, PASADENA, June, 2013. (Invited seminary).

2- “Influence of methane concentration on optical constants of Titan aerosols analogues”, Titan through time II workshop, April 2012, Goodard NASA Center (talk).

3- “Spectroscopic study of of Cyanoacetylene cation, Slow Photo-electron Spectroscopy and Ab-initio investigations”, 68th International Symposium on Molecular Spectroscopy, Ohio State University, June 2013 (talk).

4- “Slow photoelectron spectroscopy and state-selected unimolecular decomposition of ionized DNA bases analogues”. 68th International Symposium on Molecular Spectroscopy, Ohio State University, June 2013 (talk).

5- “Amines and optical properties of Titan's aerosols” EPSC 2012 (European Planetary Science Congress), Madrid: Espagne (2012) (talk)

6- “Optical properties of organic material produced in a dusty plasma”, ESCAMPIG, July 2012, Portugal (poster).

7- “Mid- and far-infrared absorption spectroscopy of Titan's tholins”, Goldshmidt-2012, Montréal (talk).

8- “Understanding the formation and properties of Titan's aerosols with the PAMPRE laboratory experiment, Goldschmidt-2012, Montréal (talk).

9- Indices optique de couches minces organiques produites par plasma RF », PAMOJSM (2012) Metz (talk).

10- “On the influence of CO on a dusty N_2-CH_4 CCP RF discharge”, ESCAMPIG, July 2012, Portugal (poster).

11- “RF capacitively coupled plasmas in N2-H2 mixtures”, ESCAMPIG, July 2012, Portugal (poster).

12- “Influence of H2 added in N2 plasma”, CIP 2011, juillet 2011, Nantes (poster)

13- Optical constants of Titan’s aerosols analogues, DPS 2011, Octobre 2011, Nantes (poster).

14- “Theoretical spectroscopy of 2-pyridone dimer”, International conference of theoretical chemistry, juin 2011, Tunisia, (poster).

15- “Chiral recognition in hydrogen bonded complexes”, Mars 2010, Institute of physical chemistry, Dusseldorf University, Germany, (talk).

16- Processus énantiosélectifs dans des complexes de van der Waals », Mars 2010, MSME, Université de Marne la vallée, (talk).

17- “Chirality influence on the aggregation of methyl mandelate”, Mars 2009, Université Paris-sud (talk).

18- “enantioselective processus in hydrogen bonded complexes” Sept 16 2007 - Sept 19 2007, 10th Workshop of PCCG (poster)

19- “Chiral recognition in the gas phase”: the role of secondary interactions, ICP 2009. (talk).