

Proposition de sujet de thèse CNRS-L/UPPA

2018-2019



Bathymétrie côtière en vue de la recherche archéologique sous-marine à Tyr par CANA-CNRS-L: la découverte du tracé d'une faille inconnue jusqu'à présent et qui prolonge l'alignement de la colonnade byzantine

Dans le cadre de l'accord entre le Conseil National de la Recherche Scientifique de la République Libanaise (CNRS-L) et l'Université de Pau et des Pays de l'Adour (UPPA) pour le co-financement des thèses de doctorat dans des thématiques d'intérêt commun, **trois bourses de recherches doctorales pour l'année 2018-2019** seront mises en place. Ces thèses sont proposées conjointement par un laboratoire de recherche de l'UPPA et un laboratoire de recherche libanais dans le cadre d'une convention de co-tutelle ou de co-direction. Ainsi, les équipes souhaitant proposer des thèses de doctorat pour l'année 2018-2019 sont priées de compléter ce formulaire de proposition de sujet de thèse et de l'envoyer par courriel **avant le 11 mai 2018** à: tamara.elzein@cnrs.edu.lb (pour CNRS Liban) et jacqueline.petitbon@univ-pau.fr (pour le collège des Ecoles doctorales de l'UPPA). Les sujets retenus seront diffusés pour l'appel à candidature, et la sélection finale des boursiers se fera par un comité mixte des deux institutions.

Il est à noter que les thématiques prioritaires pour l'année 2018-2019 sont les suivantes :

- **Ressources aquatiques**
- **Géophysique/géo-ressources**
- **Archéologie/archéométrie**
- **Géographie/aménagement/ télédétection**
- **Eco-construction**
- **Durabilité des ouvrages**
- **Environnement**
- **Energie**
- **Matériaux**
- **Informatique**
- **Sciences sociales**

Pièces à joindre :

- CV du co-directeur libanais
- CV du co-directeur français

II. Fiche de Renseignements sur le laboratoire d'accueil au Liban

Université ou centre de recherche : **Université de Balamand**

Laboratoire d'accueil : **Laboratoires de Chimie et de Génie des Procédés**

Nom du Directeur du laboratoire : **Jihad ATTIEH**

Adresse : **Deir El Balamand**

Ville : **Kelhat, El Koura**

Tél./Fax/Mél : **+961 6 930 250 #3779/ jihad.attieh@balamand.edu.lb**

Faculté ou organisme auquel est affilié le laboratoire d'accueil : **Faculté des Sciences**

Nom du Directeur de thèse : **Jane ESTEPHANE/Samer AOUAD**

Le Directeur de thèse fait-il partie du laboratoire d'accueil : **Oui**

Si non, précisez son rattachement et ses coordonnées :

- Principaux thèmes de recherche de l'équipe où sera effectué le travail de thèse :
 - **Synthèse des matériaux pour la catalyse hétérogène**
 - **Reformage du méthane, des alcools, des composés organiques volatiles**
 - **Remédiation catalytique de la pollution de l'air**
 - **Valorisation de la biomasse et du CO₂**
 - **Production catalytique de Biodiesel**
- Liste des publications récentes de l'équipe (pertinentes au sujet proposé- 3 dernières années) :

Effect of alcohol type and amount on the total energy consumption and yield of the free fatty acids esterification reaction with simultaneous adsorptive water removal

J. Touma, B. El Khoury, J. Estephane, H. El Zakhem, S. Aouad

Chemical Engineering Communications, (2018), 205 (5) pp. 689-697

Steam reforming of ethanol for hydrogen production over Cu/Co-Mg-Al-based catalysts prepared by hydrotalcite route

D. Homsy, J. Abou Rached, S. Aouad, C. Gennequin, E. Dahdah, J. Estephane, H.L. Tidahy, A. Aboukaïs, E. Abi-Aad

Environmental Science and Pollution Research, (2017), 24(11), pp. 9907-9913

Ni based catalysts promoted with cerium used in the steam reforming of toluene for hydrogen production

J. Abou Rached, C. El Hayek, E. Dahdah, C. Gennequin, S. Aouad, H. L. Tidahy, J. Estephane, B. Nsouli, A. Aboukaïs, E. Abi-Aad

International Journal of Hydrogen Energy, (2017), 42(17), pp. 12829-12840

Biodiesel production from refined sunflower vegetable oil over KOH/ZSM5 catalysts

T. Saba, J. Estephane, B. El Khoury, H. El Zakhem, M. El Khoury, M. Khazma, S. Aouad

Renewable Energy, (2016), 90 pp. 301-306

Influence of the presence of ruthenium on the activity and stability of Co-Mg-Al-based catalysts in CO₂ reforming of methane for syngas production

C. Gennequin, S. Hany, H.L. Tidahy, S. Aouad, J. Estephane, A. Aboukaïs, E. Abi-Aad
Environmental Science and Pollution Research, (2016), 23 (22), pp 22744-22760

Steam reforming of methanol over ruthenium impregnated ceria, alumina and ceria-alumina catalysts
S. Aouad, C. Gennequin, M. Mrad, H.L. Tidahy, J. Estephane, A. Aboukaïs, E. Abi-Aad
International Journal of Energy Research, (2016), 40 (9), pp. 1287-1292.

La thèse sera-t-elle effectuée en co-tutelle ou co-direction: **co-tutelle**

III. Fiche de Renseignements sur le laboratoire d'accueil à l'UPPA

Laboratoire d'accueil : **Institut des Sciences Analytiques et de Physico-Chimie pour les Matériaux et l'Environnement IPREM CNRS UMR 5254**

Nom du Directeur du laboratoire : **Ryszard Lobinsky**

Adresse : **IPREM – Helioparc Pau Pyrénées, 2 Avenue du président Angot**

Code postale-Ville : **64053 Pau**

Tél./Fax/Mél : **Tel : (33) 5 59407754 / Ryszard.Lobinski@univ-pau.fr**


Ecole doctorale auquel est affilié le laboratoire d'accueil : **Ecole Doctorale des Sciences Exactes et leurs Applications ED 211**

Nom du directeur de thèse [il/elle doit être titulaire d'une Habilitation à Diriger des Recherches (HDR)] : **Martinez Hervé**

Equipe de rattachement : **IPREM**

Téléphone : **(33) 5 59407599**

Email : **herve.martinez@univ-pau.fr**

<p><u>VISA du directeur d'équipe :</u></p> <p><u>Nom :</u> Lobinski</p> <p><u>Prénom :</u> Ryszard</p> <p><u>Date :</u> 09/05/2018</p> <p><u>Signature :</u> P.O. H. MARTINEZ Directeur Adjoint</p>	<p><u>VISA du directeur de l'Ecole doctorale :</u></p> <p><u>Nom :</u> La Directrice de l'Ecole Doctorale des sciences exactes et leurs applications (ED 211)</p> <p><u>Prénom :</u></p> <p><u>Date :</u> 9/5/2018 Mme Anna CHROSTOWSKA</p> <p><u>Signature :</u></p> 
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Nombre de thèses dirigées (ou co-dirigées) actuellement : **3**

Pour les cinq dernières années, précisez les thèses soutenues, la durée en mois pour chacune d'entre elle, la liste des publications et la situation actuelle de chaque diplômé.

1. **Thèse de Lucile Martin soutenue le 15 novembre 2013** (financement BDI CEA-CNRS), 36 mois, **Encadrement 100%**, intitulée « Etude des matériaux actifs de micro-batteries au lithium et de leurs interfaces : caractérisation des processus électrochimiques et chimiques ».- *Actuellement : Ingénieur de Recherche CDD/Université de Lille 1, à Villeneuve d'Ascq*
 - *Comprehensive X-ray Photoelectron Spectroscopy Study of the Conversion Reaction Mechanism of CuO in Lithiated Thin Film Electrodes*, L. Martin, **H. Martinez**, D. Poinot, B. Pecquenard and F. Le Cras
Journal of Physical Chemistry C **117**, 4421-4430 [IF : 4.835] **2013**

2. **Thèse de Wanjie Zhang, soutenue le 2 décembre 2014** (financement ANR), **encadrement 100%**, intitulée « Etude des interfaces de batteries Lithium-ions : application aux anodes de conversion »,.- *Actuellement : post doctorante à l'université des sciences de Tokyo (Japon)*
 - *Study of the electrode/electrolyte interface on cycling of a conversion type electrode material in Li batteries*
C. Marino, A. Darwiche, N. Dupré, H. Wilhelm, B. Lestriez, **H. Martinez**, R. Dedryvère, W. Zhang, F. Ghamouss, D. Lemordant and L. Monconduit
Journal of Physical Chemistry C **117**, 19302-19313 [IF : 4.835] **2013**
 - *Surface film formation on TiSnSb electrodes: Impact of electrolyte additives*
W. Zhang, F. Ghamouss, A. Darwiche, L. Monconduit, D. Lemordant, R. Dedryvère and **H. Martinez**
Journal of Power Sources **268**, 645-657 [IF : 6.23] **2014**
 - *Improvement of the stability of TiSnSb anode under lithiation using SEI forming additives and room temperature ionic liquid/DMC mixed electrolyte*
W. Zhang*, F. Ghamouss, D. Lemordant, R. Dedryvère, L. Monconduit, **H. Martinez**
Electrochimica Acta **170**, 72-84 [IF: 4,09] **2015**

3. **Thèse de Pierre Bernard soutenue le 16 janvier 2015** (financement ANR),), 35 mois, **encadrement 50%**, intitulée « Etude du vieillissement à long terme des interfaces dans les batteries lithium-ion associée aux énergies renouvelables » co-dirigée (50%) avec R. Dedryvère, Professeur. - *Actuellement : post doctorant au CEA Grenoble*
 - *Role of negative electrode porosity in long-term aging of NMC/graphite Li-ion batteries*
P. Bernard, H. Martinez, C. Tessier, E. Garrite, S. Franger, R. Dedryvère
Journal of The Electrochemical Society **162(13):7096-7103** [IF : 3.266] **2015**

4. **Thèse de Samantha Soule soutenue le 10 décembre 2015** (financement Conseil Général 64), 37 mois, **encadrement 50%**, intitulée « Synthèse et caractérisation de nanomatériaux hybrides de type Au@SiO₂ » co-dirigée (50%) avec J.C. Dupin, Maître de conférences HDR. - *Actuellement : post doctorante à l'université de Southampton (Angleterre)* –
 - *Design of Ag-Au nanoshell core/mesoporous oriented silica shell nanoparticles through a sol-gel surfactant templating method*, S. Soule, J. Allouche, J.-C. Dupin and **H. Martinez**
Microporous and Mesoporous Materials **171**, 72-77 [IF : 3.209] **2013**
 - *New insights into micro/nanoscale combined probes (nanoAuger, XPS) to characterize Ag/Au@SiO₂ core-shell assemblies*, J. B. Ledeuil, A. Uhart, S. Soule, J. Allouche, J. C. Dupin and **H. Martinez**
Nanoscale **6**, 11130-11140 [IF : 6.739] **2014**
 - *Design of gold nanoshells via a gelatin-mediated self-assembly of gold nanoparticles on silica cores*
S. Soule, J. Allouche, J.-C. Dupin, S. Masse, T. Coradin and **H. Martinez**
Rsc Advances **4**, 63234-63237 [IF : 3.708] **2014**
 - *Thermoresponsive gold nanoshell @ mesoporous silica nano-assemblies: a XPS / NMR survey*
S. Soulé*, J. Allouche, J.-C. Dupin, C. Courrèges, F. Plantier, W.-S. Ojo, Y. Coppel, C. Nayral, F. Delpech, **H. Martinez**
Physical Chemistry Chemical Physics, Physical Chemistry Chemical Physics, DOI: 10.1039/C5CP04491J [IF: 4,493] **2015**
 - *Design and Cellular Fate of Bioinspired Au-Ag Nanoshells@Hybrid Silica Nanoparticles*,
S. Soule, A. Bulteau, S. Faucher, B. Haye, C. Aime, J. Allouche, J. Dupin, G. Lespes, T. Coradin and **H. Martinez**

(2016)

Langmuir **32** (39), 10073-10082 [IF : 3.993] **2016**

5. Thèse de Jean-Baptiste Gieu soutenue le 15 décembre 2016 (financement SAFT/Conseil Régional Aquitaine), encadrement **100%**, 37 mois, intitulée « Etude des interfaces pour le matériau d'électrode négatif ($\text{Li}_4\text{Ti}_5\text{O}_{12}$), matériau pour batteries lithium-ion », - *Actuellement : Ingénieur R&D Société Bolloré*

- *Temperature effects on $\text{Li}_4\text{Ti}_5\text{O}_{12}$ electrode/electrolyte interfaces: A X-ray Photoelectron Spectroscopy and Scanning Auger Microscopy study*, J.-B. Gieu; C. Courrèges; L. El Ouatani; C. Tessier; **H. Martinez** (2016) *Journal of Power Sources*, **318**, 291-301 [IF : 6.23] **2016**
- *Influence of Vinylene Carbonate Additive on the $\text{Li}_4\text{Ti}_5\text{O}_{12}$ Electrode/Electrolyte Interface for Lithium-Ion Batteries*, J.-B. Gieu; C. Courrèges; L. El Ouatani; C. Tessier; **H. Martinez** *Journal of the Electrochemical Society* **164**(6):A1314-A1320 **2017**
- *New insights in the characterization of the electrode/electrolyte interfaces within $\text{LiMn}_2\text{O}_4 / \text{Li}_4\text{Ti}_5\text{O}_{12}$ cells, by X-ray Photoelectron Spectroscopy, Scanning Auger Microscopy and Time-of-Flight Secondary Ion Mass Spectrometry*, J.B. Gieu, V. Winkler; C. Courrèges; L. El Ouatani; C. Tessier; **H. Martinez** *Journal of Materials Chemistry A*, **5** (29) [IF: 8.86] **2017**

6. Thèse de Rabeb Grissa, soutenue le 10 février 2017 (financement PIA 'Tours 2015'), 40 mois, encadrement **100%**, intitulée « Apport de la Spectroscopie XPS à l'étude de nouveaux matériaux d'électrodes pour microbatteries au lithium », - *Actuellement : post doctorante à l'Institut Jean Rouxel, Nantes*

- *Lithium-rich manganese oxide spinel thin films as 3 V electrode for lithium batteries* S. Cotte, B. Pecquenard, F. Le Cras, R. Grissa, **H. Martinez**, L. Bourgeois *Electrochimica Acta*, **180** (2015) 528–534 [IF: 4,09] **2015**
- *An X-ray photoelectron spectroscopy study of the electrochemical behaviour of iron molybdate thin films in lithium and sodium cells*, R. Grissa, **H. Martinez**, V. Pelé, S. Cotte, B. Pecquenard, F. Le Cras *Journal of Power Sources* **342**, 796-807 [IF : 6.333] **2017**
- *Thorough XPS analyses on overlithiated manganese spinel cycled around the 3V plateau* R. Grissa, **H. Martinez**, V. Pelé, S. Cotte, B. Pecquenard, F. Le Cras *Applied Surf. Science* **411**, 449-456 [IF: 6.32] **2017**

Principaux thèmes de recherche de l'équipe où sera effectué le travail de thèse :

Physico-chimie des Matériaux / Analyse des Surfaces et Interfaces

Domaines : Stockage Electrochimique de l'énergie, Corrosion et Revêtement de Surface, Réactivité de Surface et Catalyse

Liste des publications récentes de l'équipe (pertinentes au sujet proposé) :

2018

Large-scale oxidation of multi-walled carbon nanotubes in fluidized bed from ozone-containing gas mixtures

P. Lassegue, L. Noe, J. Dupin, M. Monthieux and B. Caussat (2018)
Canadian Journal of Chemical Engineering 96 (688-695) [IF : 1.356]

Cu-doping of calcium phosphate bioceramics: From mechanism to the control of cytotoxicity

S. Gomes, C. Vichery, S. Descamps, H. Martinez, A. Kaur, A. Jacobs, J. Nedelec and G. Renaudin (2018)
Acta Biomaterialia 65 (462-474) [IF : 6.319]

Iron molybdate thin films prepared by sputtering and their electrochemical behavior in Li batteries

S. Cotte, V. Pele, B. Pecquenard, F. Le Cras, R. Grissa, L. Bourgeois, M. Sougrati and H. Martinez (2018)
Journal of Alloys and Compounds 735 (1454-1462) [IF : 3.133]

Fluorinated reduced graphene oxide as a protective layer on the metallic lithium for application in the high energy batteries

J. Bobnar, M. Lozinsek, G. Kapun, C. Njel, R. Dedryvere, B. Genorio and R. Dominko (2018)
Scientific Reports 8 [IF : 4.259]

Surface engineering of ITO electrode with a functional polymer for PEDOT:PSS-free organic solar cells

H. Awada, G. Mattana, A. Tournebize, L. Rodriguez, D. Flahaut, L. Vellutini, C. Lartigau-Dagron, L. Billon, A. Bousquet and S. Chambon (2018)
Organic Electronics 57 (186-193) [IF : 3.399]

2017

Effect of the Functionalization Process on the Colloidal, Magnetic Resonance Imaging, and Bioelimination Properties of Mono- or Bisphosphonate-Anchored Dendronized Iron Oxide Nanoparticles

A. Walter, A. Garofalo, P. Bonazza, F. Meyer, H. Martinez, S. Fleutot, C. Billotey, J. Taleb, D. Felder-Flesch and S. Begin-Colin (2017)
Chempluschem 82 (647-659) [IF : 2.797]

Nanoscale Chemical Characterization of Solid-State Microbattery Stacks by Means of Auger Spectroscopy and Ion-Milling Cross Section Preparation

A. Uhart, J. Ledeuil, B. Pecquenard, F. Le Cras, M. Proust and H. Martinez (2017)
ACS applied materials & interfaces 9 (33238-33249) [IF : 7.504]

Morphology and Surface Reactivity Relationship in the $Li_1+xMn_2-xO_4$ Spinel with $x=0.05$ and 0.10 : A Combined First-Principle and Experimental Study

A. Quesne-Turin, G. Vallverdu, D. Flahaut, J. Allouche, L. Croguennec, M. Menetrier and I. Baraille (2017)
ACS applied materials & interfaces 9 (44922-44930) [IF : 7.504]

Surface Reactivity of Li_2MnO_3 : First-Principles and Experimental Study

A. Quesne-Turin, D. Flahaut, L. Croguennec, G. Vallverdu, J. Allouche, Y. Charles-Blin, J. Chotard, M. Menetrier and I. Baraille (2017)
ACS applied materials & interfaces 9 (44222-44230) [IF : 7.504]

Plasma and fluorination combination for stable multifunctionality of LDPE packaging films

J. Peyroux, M. Dubois, E. Tomasella, N. Batische, L. Frezet, E. Petit, A. Kharitonov and D. Flahaut (2017)
Plasma processes and polymers 14 [IF : 2.846]

Evidence for anionic redox activity in a tridimensional-ordered Li-rich positive electrode β - Li_2IrO_3

P. E. Pearce, A. J. Perez, G. Rousse, M. Saubanere, D. Batuk, D. Foix, E. McCalla, A. M. Abakumov, G. Van Tendeloo, M.-L. Doublet and J.-M. Tarascon (2017)
Nature Materials 16 (580+) [IF : 39.737]

Structural evidence of a phosphoinositide-binding site in the Rgd1-RhoGAP domain

D. Martinez, B. d'Estaintot, T. Granier, J. Tolchard, C. Courreges, V. Prouzet-Mauleon, M. Hugues, B. Gallois, F. Doignon and B. Odaert (2017)
Biochemical Journal 474 (3307-3319) [IF : 3.797]

Exploring Interactions between Electrodes in $Li[NixMnyCo_{1-xy}]O_2$ /Graphite Cells through Electrode/Electrolyte Interfaces Analysis

PROPOSITION THESE CNRS-L/UPPA

L. Madec and L. Ellis (2017)

Journal of The Electrochemical Society 164 (A3718-A3726) [IF : 3.259]

Hexakis [60]Fullerene Adduct-Mediated Covalent Assembly of Ruthenium Nanoparticles and Their Catalytic Properties

F. Leng, I. Gerber, P. Lecante, A. Bentaleb, A. Munoz, B. Illescas, N. Martin, G. Melinte, O. Ersen, H. Martinez, M. Axet and P. Serp (2017)

Chemistry : A European Journal 23 (13379-13386) [IF : 5.317]

An X-ray photoelectron spectroscopy study of the electrochemical behaviour of iron molybdate thin films in lithium and sodium cells

R. Grissa, H. Martinez, V. Pele, S. Cotte, B. Pecquenard and F. Le Cras (2017)

Journal of Power Sources 342 (796-807) [IF : 6.395]

Thorough XPS analyses on overlithiated manganese spinel cycled around the 3V plateau

R. Grissa, H. Martinez, S. Cotte, J. Galipaud, B. Pecquenard and F. Le Cras (2017)

Applied Surface Science 411 (449-456) [IF : 3.387]

Influence of Vinylene Carbonate Additive on the Li4Ti5O12 Electrode/Electrolyte Interface for Lithium-Ion Batteries

J.-B. Gieu, C. Courreges, L. El Ouatani, C. Tessier and H. Martinez (2017)

Journal of The Electrochemical Society 164 (A1314-A1320) [IF : 3.259]

New insights into the characterization of the electrode/electrolyte interfaces within LiMn2O4/Li4Ti5O12 cells, by X-ray photoelectron spectroscopy, scanning Auger microscopy and time-of-flight secondary ion mass spectrometry

J. Gieu, V. Winkler, C. Courreges, L. El Ouatani, C. Tessier and H. Martinez (2017)

Journal of Materials Chemistry A 5 (15315-15325) [IF : 8.867]

Identification of sulphur, oxygen and nitrogen species in heavy oils by X-ray photoelectron spectroscopy

D. Flahaut, M. Minvielle, A. Sambou, P. Lecour, C. Legens and J. Barbier (2017)

Fuel 202 (307-317) [IF : 4.601]

Dual Cation- and Anion-Based Redox Process in Lithium Titanium Oxysulfide Thin Film Cathodes for All-Solid-State Lithium-Ion Batteries

V. Dubois, B. Pecquenard, S. Soule, H. Martinez and F. Le Cras (2017)

ACS applied materials & interfaces 9 (2275-2284) [IF : 7.504]

Interface Stability of Argyrodite Li6PS5Cl toward LiCoO2, LiNi1/3Co1/3Mn1/3O2, and LiMn2O4 in Bulk All-Solid-State Batteries

J. Auvergniot, A. Cassel, J.-B. Ledeuil, V. Viallet, V. Seznec and R. Dedryvere (2017)

Chem. Mater. 29 (3883-3890) [IF : 9.466]

Redox activity of argyrodite Li6PS5Cl electrolyte in all-solid-state Li-ion battery: An XPS study

J. Auvergniot, A. Cassel, D. Foix, V. Viallet, V. Seznec and R. Dedryvere (2017)

Solid State Ionics 300 (78-85) [IF : 2.354]

Decoupling Cationic-Anionic Redox Processes in a Model Li-Rich Cathode via Operando X-ray Absorption Spectroscopy

G. Assat, A. Iadecola, C. Delacourt, R. Dedryvere and J. Tarascon (2017)

Chemistry of Materials 29 (9714-9724) [IF : 9.466]

Fundamental interplay between anionic/cationic redox governing the kinetics and thermodynamics of lithium-rich cathodes

G. Assat, D. Foix, C. Delacourt, A. Iadecola, R. Dedryvere and J. Tarascon (2017)

Nature Communications 8 [IF : 12.124]

Interest of molecular functionalization for electrochemical storage

B. Anothumakkool, D. Guyomard, J. Gaubicher and L. Madec (2017)

Nano Research 10 (4175-4200) [IF : 7.354]

2016

Microsized Sn as Advanced Anodes in Glyme-Based Electrolyte for Na-Ion Batteries

B. Zhang, G. Rousse, D. Foix, R. Dugas, D. A. D. Corte and J.-M. Tarascon (2016)

Advanced Materials [IF : 18.960]

An Auger and XPS survey of cerium active corrosion protection for AA2024-T3 aluminum alloy
A. Uhart, J. Ledeuil, D. Gonbeau, J. Dupin, J. Bonino, F. Ansart and J. Esteban (2016)
Applied Surface Science 390 (751-759) [IF : 3.150]

Design and Cellular Fate of Bioinspired Au-Ag Nanoshells@Hybrid Silica Nanoparticles
S. Soule, A. Bulteau, S. Faucher, B. Haye, C. Aime, J. Allouche, J. Dupin, G. Lespes, T. Coradin and H. Martinez (2016)
Langmuir 32 (10073-10082) [IF : 3.993]

Surface modification of low-density polyethylene packaging film via direct fluorination
J. Peyroux, M. Dubois, E. Tomasella, N. Batisse, A. P. Kharitonov, D. Flahaut, L. Romana and P. Thomas (2016)
Surface & Coatings Technology 292 (144-154) [IF : 2.139]

Plasma and fluorination combination for stable multifunctionality of LDPE packaging films
J. Peyroux, M. Dubois, E. Tomasella, N. Batisse, L. Frezet, E. Petit, A. P. Kharitonov and D. Flahaut, Delphine (2016)
Plasma Process Polym [IF : 2.713]

Strong Oxygen Participation in the Redox Governing the Structural and Electrochemical Properties of Na-Rich Layered Oxide Na₂IrO₃
A. J. Perez, D. Batuk, M. Saubanere, G. Rousse, D. Foix, E. McCalla, E. J. Berg, R. Dugas, K. H. W. van den Bos, M. L. Doublet, D. Gonbeau, A. M. Abakumov, G. Van Tendeloo and J. M. Tarascon (2016)
Chemistry of Materials 28 (8278-8288) [IF : 9.407]

Pseudomorphic Transformation of Layered Simple Hydroxides into Prussian Blue Analogue Nanoplatelets
M. Lang, E. Delahaye, D. Foix, D. Ihiawakrim, O. Ersen, C. Leuvre, J.-M. Greneche, G. Rogez and P. Rabu (2016)
European Journal of Inorganic Chemistry (2030-2038) [IF : 2.686]

Temperature effects on Li₄Ti₅O₁₂ electrode/electrolyte interfaces at the first cycle: A X-ray Photoelectron Spectroscopy and Scanning Auger Microscopy study
J. B. Gieu, C. Courreges, L. El Ouatani, C. Tessier and H. Martinez (2016)
Journal of Power Sources 318 (291-301) [IF : 6.333]

*The highly variable microbiota associated to intestinal mucosa correlates with growth and hypoxia resistance of sea bass, *Dicentrarchus labrax*, submitted to different nutritional histories*
F. J. H. Gatesoupe, C. ;Le Bayon, N. ;Le Delliou, H. ;Madec, L. ;Mouchel, O. ;Quazuguel, P. ;Mazurais, D. ;Zambonino-Infante, J. L. (2016)
Bmc Microbiology 16 [IF : 2.581]

X-ray Photoemission Spectroscopy Study of Cationic and Anionic Redox Processes in High-Capacity Li-Ion Battery Layered-Oxide Electrodes
D. Foix, M. Sathiya, E. McCalla, J.-M. Tarascon and D. Gonbeau (2016)
Journal of Physical Chemistry C 120 (862-874) [IF : 3.187]

Role of Ag in textured-annealed Bi₂Ca₂Co_{1.7}O_x thermoelectric ceramic
D. Flahaut, J. Allouche, A. Sotelo, S. Rasekh, M. A. Torres, M. A. Madre and J. C. Diez (2016)
Acta Materialia 102 (273-283) [IF : 5.058]

Impact of the salts and solvents on the SEI formation in Sb/Na batteries: An XPS analysis
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Y. Tison, J. Lagoute, V. Repain, C. Chacon, Y. Girard, S. Rousset, F. Joucken, D. Sharma, L. Henrard, H. Amara, A. Ghedjatti and F. Ducastelle (2015)
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Science 350 (1516-1521) [IF : 33.611]

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D. Matioszek, W.-S. Ojo, A. Cornejo, N. Katir, M. El Ezzi, M. Le Troedec, H. Martinez, H. Gornitzka, A. Castel, C. Nayral and F. Delpech (2015)
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T. Khoa Le, D. Flahaut, H. Martinez, H. K. Hung Nguyen and T. K. Xuan Huynh (2015)
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The Solid Electrolyte Interphase a key parameter of the high performance of Sb in sodium-ion batteries: Comparative X-ray Photoelectron Spectroscopy study of Sb/Na-ion and Sb/Li-ion batteries

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Journal of the Electrochemical Society 162 (A7096-A7103) [IF : 3.266]

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H. Awada, L. Mezzasalma, S. Blanc, D. Flahaut, C. Dagron-Lartigau, J. Lyskawa, P. Woisel, A. Bousquet and L. Billon (2015)

Macromolecular Rapid Communications 36 (1486-1491) [IF : 4.941]

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W. Zhang, F. Ghamouss, A. Darwiche, L. Monconduit, D. Lemordant, R. Dedryvere and H. Martinez (2014)
Journal of Power Sources 268 (645-657) [IF : 4.675]

High-Performing Monometallic Cobalt Layered Double Hydroxide Supercapacitor with Defined Local Structure

P. Vialat, C. Mousty, C. Taviot-Gueho, G. Renaudin, H. Martinez, J.-C. Dupin, E. Elkaim and F. Leroux (2014)
Advanced Functional Materials 24 (4831-4842) [IF : 10.439]

Plasmonic gold-silver alloy on TiO₂ photocatalysts with tunable visible light activity

S. W. Verbruggen, M. Keulemans, M. Filippousi, D. Flahaut, G. Van Tendeloo, S. Lacombe, J. A. Martens and S. Lenaerts (2014)
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Surface fluorination of single-phase TiO₂ by thermal shock method for enhanced UV and visible light induced photocatalytic activity

L. Tien Khoa, D. Flahaut, H. Martinez, T. Pigot, N. Huu Khanh Hung and H. Thi Kieu Xuan (2014)
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S. Pommiers-Belin, J. Frayret, A. Uhart, J. Ledeuil, J.-C. Dupin, A. Castetbon and M. Potin-Gautier (2014)
Applied Surface Science 298 (199-207) [IF : 2.112]

Enhanced electrochemical performance of Lithium-ion batteries by conformal coating of polymer electrolyte

N. Plylahan, S. Maria, T. N. T. Phan, M. Letiche, H. Martinez, C. Courreges, P. Knauth and T. Djenizian (2014)
Nanoscale Research Letters 9 (544-544) [IF : 2.481]

MnSn₂ electrodes for Li-ion batteries: Mechanisms at the nano scale and electrode/electrolyte interface

B. Philippe, A. Mahmoud, J. B. Ledeuil, M. T. Sougrati, K. Edstrom, R. Dedryvere, D. Gonbeau and P. E. Lippens (2014)
Electrochimica Acta 123 (72-83) [IF : 3.777]

Enhancement of surface properties on commercial polymer packaging films using various surface treatment processes (fluorination and plasma)

J. Peyroux, M. Dubois, E. Tomasella, E. Petit and D. Flahaut (2014)
Applied Surface Science 315 (426-431) [IF : 2.112]

Direct observation of important morphology and composition changes at the surface of the CuO conversion material in lithium batteries

L. Martin, H. Martinez, D. Poinot, B. Pecquenard and F. Le Cras (2014)
Journal of Power Sources 248 (861-873) [IF : 4.675]

New insights into micro/nanoscale combined probes (nanoAuger, muXPS) to characterize Ag/Au@SiO₂ core-shell assemblies

J. B. Ledeuil, A. Uhart, S. Soule, J. Allouche, J. C. Dupin and H. Martinez (2014)
Nanoscale 6 (11130-40) [IF : 6.739]

Sn-119 Mossbauer spectroscopy study of the mechanism of lithium reaction with self-organized Ti_{1/2}Sn_{1/2}O₂ nanotubes

N. A. Kyeremateng, M. T. Sougrati, J. C. Jumas and H. Martinez (2014)
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Improvement of Electrode/Electrolyte Interfaces in High-Voltage Spinel Lithium-Ion Batteries by Using Glutaric Anhydride as Electrolyte Additive

H. Bouayad, Z. Wang, N. Dupre, R. Dedryvere, D. Foix, S. Franger, J. F. Martin, L. Boutafa, S. Patoux, D. Gonbeau and D. Guyomard (2014)

Journal of Physical Chemistry C 118 (4634-4648) [IF : 4.814]

Biosorption of chromium by alginate extraction products from Sargassum filipendula: Investigation of adsorption mechanisms using X-ray photoelectron spectroscopy analysis

C. Bertagnolli, A. Uhart, J.-C. Dupin, M. G. Carlos da Silva, E. Guibal and J. Desbrieres (2014)

Bioresource Technology 164 (264-269) [IF : 5.039]

2013

Design of Ag-Au nanoshell core/mesoporous oriented silica shell nanoparticles through a sol-gel surfactant templating method
S. Soule, J. Allouche, J.-C. Dupin and H. Martinez (2013)

Microporous and Mesoporous Materials 171 (72-77) [IF : 3.365]

Reversible anionic redox chemistry in high-capacity layered-oxide electrodes

M. Sathiya, G. Rousse, K. Ramesha, C. P. Laisa, H. Vezin, M. T. Sougrati, M. L. Doublet, D. Foix, D. Gonbeau, W. Walker, A. S. Prakash, M. Ben Hassine, L. Dupont and J. M. Tarascon (2013)

Nature Materials 12 (827-835) [IF : 35.749]

High Performance Li₂Ru_{1-y}MnyO₃ (0.2 ≤ y ≤ 0.8) Cathode Materials for Rechargeable Lithium-Ion Batteries: Their Understanding

M. Sathiya, K. Ramesha, G. Rousse, D. Foix, D. Gonbeau, A. S. Prakash, M. L. Doublet, K. Hemalatha and J. M. Tarascon (2013)

Chemistry of Materials 25 (1121-1131) [IF : 8.238]

Li₄NiTeO₆ as a positive electrode for Li-ion batteries

M. Sathiya, K. Ramesha, G. Rousse, D. Foix, D. Gonbeau, K. Guruprakash, A. S. Prakash, M. L. Doublet and J. M. Tarascon (2013)

Chemical Communications 49 (11376-11378) [IF : 6.378]

Towards high energy density sodium ion batteries through electrolyte optimization

A. Ponrouch, R. Dedryvere, D. Monti, A. E. Demet, J. M. A. Mba, L. Croguennec, C. Masquelier, P. Johansson and M. R. Palacin (2013)

Energy and Environmental Science 6 (2361-2369) [IF : 11.653]

Improved Performances of Nanosilicon Electrodes Using the Salt LiFSI: A Photoelectron Spectroscopy Study

B. Philippe, R. Dedryvere, M. Gorgoi, H. Rensmo, D. Gonbeau and K. Edstrom (2013)

Journal of the American Chemical Society 135 (9829-9842) [IF : 10.677]

Role of the LiPF₆ Salt for the Long-Term Stability of Silicon Electrodes in Li-Ion Batteries - A Photoelectron Spectroscopy Study

B. Philippe, R. Dedryvere, M. Gorgoi, H. Rensmo, D. Gonbeau and K. Edstrom (2013)

Chemistry of Materials 25 (394-404) [IF : 8.238]

Formation of Bimetallic FeBi Nanostructured Particles: Investigation of a Complex Growth Mechanism

J. G. Mattei, F. Pelletier, D. Ciuculescu, P. Lecante, J. C. Dupin, N. Yaacoub, J. Allouche, J. M. Greneche, D. Gonbeau, C. Amiens and M. J. Casanove (2013)

Journal of Physical Chemistry C 117 (1477-1484) [IF : 4.814]

Comprehensive X-ray Photoelectron Spectroscopy Study of the Conversion Reaction Mechanism of CuO in Lithiated Thin Film Electrodes

L. Martin, H. Martinez, D. Poinot, B. Pecquenard and F. Le Cras (2013)

Journal of Physical Chemistry C 117 (4421-4430) [IF : 4.814]

Electrochemical performances and mechanisms of MnSn₂ as anode material for Li-ion batteries

A. Mahmoud, M. Chamas, J.-C. Jumas, B. Philippe, R. Dedryvere, D. Gonbeau, I. Saadoun and P.-E. Lippens (2013)

Journal of Power Sources 244 (246-251) [IF : 4.675]

Effect of Sn-doping on the electrochemical behaviour of TiO₂ nanotubes as potential negative electrode materials for 3D Li-ion micro batteries

N. A. Kyeremateng, F. Vacandio, M. T. Sougrati, H. Martinez, J. C. Jumas, P. Knauth and T. Djenizian (2013)

Journal of Power Sources 224 (269-277) [IF : 4.675]

The Electrode/Electrolyte Reactivity of LiFe(0.33)Mn(0.67)PO(4) Compared to LiFePO(4)

A. Gueguen, L. Castro, R. Dedryvere, E. Dumont, J. Breger, C. Tessier and D. Gonbeau (2013)

Journal of the Electrochemical Society 160 (A387-A393) [IF : 2.588]

Lithium borophosphate thin film electrolyte as an alternative to LiPON for solder-reflow processed lithium-ion microbatteries

B. Fleutot, B. Pecquenard, H. Martinez and A. Levasseur (2013)

Solid State Ionics 249 (49-55) [IF : 2.046]

Li-S batteries: simple approaches for superior performance

PROPOSITION THESE CNRS-L/UPPA

R. Demir-Cakan, M. Morcrette, Gangulibabu, A. Gueguen, R. Dedryvere and J.-M. Tarascon (2013)
Energy and Environmental Science 6 (176-182) [IF : 11.653]

Lithium-ion batteries: Ageing processes and surface/interface phenomena
R. Dedryvere, L. Bodenes, B. Philippe, H. Martinez and D. Gonbeau (2013)
Abstracts of Papers of the American Chemical Society 245 [IF :]

Lithium secondary batteries working at very high temperature: Capacity fade and understanding of aging mechanisms
L. Bodenes, R. Naturel, H. Martinez, R. Dedryvere, M. Menetrier, L. Croguennec, J.-P. Peres, C. Tessier and F. Fischer (2013)
Journal of Power Sources 236 (265-275) [IF : 4.675]

Effect of the nanoparticle synthesis method on dendronized iron oxides as MRI contrast agents
B. Basly, G. Popa, S. Fleutot, B. P. Pichon, A. Garofalo, C. Ghobril, C. Billotey, A. Bernard, P. Bonazza, H. Martinez, D. Felder-Flesch and S. Begin-Colin (2013)
Dalton Transactions 42 (2146-2157) [IF : 3.806]

IV. Sujet de thèse

A faire signer obligatoirement par tous les co-directeurs

IV.1. Titre

Catalytic Transesterification of Waste Oil into Biodiesel

*La thèse fait-elle partie d'un projet de recherche financé par le CNRS-L : **Non**

Si oui, précisez :

*La thématique sous laquelle s'inscrit la thèse fait-elle partie des priorités de cet appel pour l'année 2018-2019 (voir annonce): **Oui**

Si oui, précisez (possibilité de choisir plus qu'une) : **Environnement, Energie, Matériaux**

Si non, définir une:

IV.2. Résumé (ne pas dépasser 200 mots)

Waste oil can rapidly become an environmental burden if adequate strategies are not adopted. As our country (Lebanon) faces a major waste management problem, collecting and transforming waste oil into a fuel is an important remediation path. In order to make the vegetable oil conversion reaction industrially viable, catalysis will play an important role. Our research in this project will focus on the development of a heterogeneous basic material (catalyst) that can catalyze the vegetable oil trans-esterification reaction to produce biodiesel. The developed catalyst will be easily recovered (compared to homogeneous alternatives) and should show efficient reusability in order to process several batches. The developed material will be tested first on unused vegetable oil for reproducibility reasons. Simultaneously, the production and use of vegetable oil in Lebanon will be assessed and the potential waste vegetable oil production will be evaluated. Based on the collected data, a prototype plant will be theoretically designed to accommodate the waste vegetable oil quantities and convert it into biodiesel.

Finally, the developed material will be tested on the pretreated waste vegetable oil sample and the kinetics result will be integrated in the prototype calculations. By then, the project will yield a model plant with our developed material for waste vegetable oil treatment in Lebanon.

IV.3. Contexte et problématique (ne pas dépasser 200 mots)

Dealing with wastes is one of the current problems Lebanon is facing and posing a huge negative effect on health and the environment. Waste vegetable oils (especially from the food industry) are a part of this problem and it is therefore important to consider this issue to avoid the irreversible public health damage

and the underground water contamination it might cause. If managed properly, waste oil can be a very treasured resource. In the last few years, alternative methods for the production of biodiesel from waste oil have been gaining attention. Several methods employed the synthesis of catalysts as to enhance the reaction of transformation of waste oil into biodiesel. One of these methods depends on the use of heterogeneous catalysts [1] which will constitute the main focus of our project.

[1] L. K. Man, L. T. Keat, M. Abdul Rahman, Homogeneous heterogeneous and enzymatic catalysis for transesterification of high free fatty acid oil (waste cooking oil) to biodiesel: A review, *Biotechnology Advances* 28 (2010) 500-518.

IV.4. Descriptif des objectifs et de l'impact (ne pas dépasser 200 mots)

The main project aims are listed below:

The project objectives fall under the "Waste to Energy" topic and are listed below:

- To reduce the amount of waste vegetable oil (Food Industr,... that is discarded to the environment
- To transform the waste oil into Biodiesel using a novel basic heterogeneous catalyst (Laboratory scale)
- To collect data related to waste vegetable oil generation in Lebanon and use for the design of a theoretical treatment prototype plant
- To test the quality of the produced biodiesel for eventual blending with diesel used to power up selected trucks, electric power generators and industrial fuel powered devices.

The impact of the project is better discussed in section IV.5.

IV.5. Aspect appliqué et/ou aspect innovateur (ne pas dépasser 200 mots)

To our knowledge, waste vegetable oil isn't being properly recycled in Lebanon. It is discarded in waterways and ends up flowing in the Mediterranean Sea, leaked through the soil and contaminates the underground water or burnt without any kind of control. Therefore, we consider that the project is unique in the national context. Moreover, we do not intend to perform traditional trans-esterification. We are in the process of developing a heterogeneous basic catalyst that can be used for several cycles. In addition, we already tried the simultaneous adsorption of water to increase the yield and we obtained very promising results. Based on the above, we consider that this research and development project is unique and innovative.

The trans-esterification reaction is not a new one. Several scientists have published excellent papers dealing with it. But in the context of this call, we believe that our proposal will promote research initiatives/collaborations with a new team in France and contribute to solve problems at the national level.

IV.6. Etat des recherches dans le domaine avant la thèse (ne pas dépasser 200 mots) + Ref. Bibliographiques

A quick search on "scopus", using the key words "waste vegetable oil transesterification", shows that only 245 papers were published between 1986 and 2018.

The majority of these last correspond to the last 7 years [1-9]. This means that this area is gaining importance and remains relatively new. As far as our research team is concerned, we have worked with catalysts and are still looking for materials good enough for industrial application. We benefit with our potential French partners from a considerable experience in the field of development, characterization and application of materials. We plan to take advantage of this expertise to apply it to waste vegetable oils valorization and to develop a solution for a major environmental problem.

[1] Veljković, V.B., Biberdžić, M.O., Banković-Ilić, I.B., Djalović, I.G., Tasić, M.B., Nježić, Z.B., Stamenković, O.S. Biodiesel production from corn oil: A review (2018) *Renewable and Sustainable Energy Reviews*, 91, pp. 531-548.

[2] Aboelazayem, O., Gadalla, M., Saha, B. Biodiesel production from waste cooking oil via supercritical methanol: Optimisation and reactor simulation (2018) *Renewable Energy*, 124, pp. 144-154

[3] Mohammed, A.R., Bandari, C. Lab-scale catalytic production of biodiesel from waste cooking oil – a review (2017) *Biofuels*, pp. 1-11.

[4] Maceiras, R., Alfonsín, V., Cancela, Á., Sánchez, Á. Biodiesel Production from Waste Frying Oil by Ultrasound-Assisted Transesterification (2017) *Chemical Engineering and Technology*, 40 (9), pp. 1713-1719

[5] Kayode, B., Hart, A. An overview of transesterification methods for producing biodiesel from waste vegetable oils, (2017) *Biofuels*, pp. 1-19.

[6] Karki, S., Sanjel, N., Poudel, J., Choi, J.H., Oh, S.C. Supercritical transesterification of waste vegetable oil: Characteristic comparison of ethanol and methanol as solvents (2017) *Applied Sciences (Switzerland)*, 7 (6), art. no. 632, .

[7] Wang, X., Qin, X., Li, D., Yang, B., Wang, Y. One-step synthesis of high-yield biodiesel from waste cooking oils by a novel and highly methanol-tolerant immobilized lipase (2017) *Bioresource Technology*, 235, pp. 18-24.

[8] Fan, R., Zhao, J., Du, Y., Zhao, W., Guo, W., Yang, J., Chen, X. Biodiesel production from Fructus Schisandrae seed oil (2017) *Indian Journal of Biotechnology*, 16 (1), pp. 114-118.

[9] Aboelazayem, O., Gadalla, M., Saha, B. An experimental-based energy integrated process for Biodiesel production from waste cooking oil using supercritical methanol (2017) *Chemical Engineering Transactions*, 61, pp. 1645-1650.

IV.7. Programme de recherche prévu pour la thèse et contribution des différents partenaires (ne pas dépasser 200 mots)

For the thesis, the work will be shared equally between the partner institutions:

- Synthesis of the materials will be done in Lebanon
 - Mg-Al layered double hydroxides with different Mg/Al ratios.
 - After calcinations these solids will be rehydrated to enhance their basicity
 - doping by substitution with calcium, lanthanum and other elements
 - other basic materials (metal oxides) will also be prepared and its basicity evaluated
- Sample waste oil Collection, Waste oil pretreatment (filtering, water content determination, water removal, acidity determination, acidity reduction, settling, separation), Basic catalytic trans-

esterification of the pretreated oil into Biodiesel with water adsorption option (increase the yield) (Balamand)

- Produced Biodiesel conformity testing (Balamand)
- Characterization of the materials before and after the test will be done in both institutions according to the availability of the PhD student. Most of surface analyses (XPS, AES, SEM, AFM, ToF-SIMS) of the fresh and used catalysts will be evaluated in UPPA. Textural and acid/base analyses will be performed at Balamand
- Design of the theoretical prototype plant will be done in Lebanon in collaboration with French colleagues. (Balamand-UPPA).

IV.8. Calendrier prévisionnel des mobilités

The mobility will respect the schedule which will be part of the agreement of the joint thesis (co-tutelle) to be signed by the two partners. Usually, for a joint PhD thesis, the mobility will be done over 3 years, during which the PhD student will spend half of the year in each institution.

IV.9. Diffusion/valorisation des résultats

The obtained results will be jointly published in international journals. These eventual publications, will mention the funders in the acknowledgement section of the thesis.

The results will also be presented in at least two national and/or international conferences.

The success of the prototype at the scale of the laboratory will also allow to consider a possible application on a large scale.

IV.10. Compétences requises

We are particularly looking for candidates with skills in physical chemistry and material synthesis. The candidate should have a good working experience in a chemistry laboratory, and should be able to continue the ongoing developments of the project.

Date : 09/05/2018

Noms et signatures (directeurs de thèse)

Martinez Hervé

Aouad Samer

Estephane Jane