



Dr. Thomas Lécuyer

PhD in Chemistry-Biology

Keywords: NPs for imaging, surface chemistry, NPs degradation & toxicity, *in vitro* & *in vivo* models

Education

- 2015-2018 PhD at Unit of Chemical and Biological Technologies for Health (UTCBS), Paris Descartes University of Pharmacy.
- 2012-2015 Student at *Chimie ParisTech, Ecole Nationale Supérieure de Chimie de Paris*, former *ENSCP*, graduate school of chemical science and engineering. *Diplôme d'ingénieur Chimie ParisTech* obtained in July 2015, conferring a Master of Science in chemical science and engineering.

Research activities

- 2022-2023 Postdoctoral fellowship in Catania University (Italy), PRIN project "PHOLIES: photoresponsive host-guest functional systems in liposomes". Supervisor: Dr. Aurore Fraix.
Use of DASAs compounds in liposomes formulation for drug delivery and inorganic nanoparticles functionalization.
- 2019-2021 Postdoctoral fellowship in MSC laboratory (Paris University), European project NanoTBTech (FET open founding). Supervisor: Dr. Florence Gazeau. Subject: Functionalization and evaluation of nano-thermometers for temperature imaging and cancer therapy.
Work has been divided in three main aspects: i) Stabilization and functionalization of various nanoparticles from the different European laboratories of the consortium (Ag_2S , NaYF_4 , polymeric micelles, YIG/YAG), PEGylation and grafting of an antibody (Cetuximab) for active targeting, cytotoxicity assessment, biodistribution and *in vivo* tumor targeting, ii) *In vitro* behavior, degradation and fate of Ag_2S nanoparticles in differentiated macrophages THP1 cell line, iii) writing of deliverables for the European union, oral presentations for evaluation in front of a stirring committee, online meetings for optimal cooperation with the different member of the consortium.
Use of antibody functionalization, ligand exchange process optimization, *in vitro* procedure (cytotoxicity assay, TEM and confocal imaging, spectroscopy on fixed cells, ICP), *in vivo* cancer models, physico-chemical characterizations (TGA, ATR-FTIR, DLS, TEM).
- 2015-2018 PhD in chemistry/biology entitled: "Persistent luminescent nanoparticles ($\text{ZnGa}_2\text{O}_4:\text{Cr}^{3+}$) for *in vivo* imaging: characterization, functionalization and fate". Supervisor: Dr. Cyrille Richard.
Work has been divided in two main aspects: i) Development of new functionalization strategies (zwitterionic coating and co-polymers bearing phosphonic acid anchors), physico-chemical characterization, *in vivo* evaluation, determination of a storage method, ii) Evaluation of the degradability of the NPs in a lysosomal-like medium, a complete *in vivo* one-year study to assess the NP's biotransformation and toxicity.

Use of *in vivo* model (French diploma to manage *in vivo* studies), biological sample preparation and observation (bioluminescence, histology, TEM, blood count, plasma dosage), inorganic and organic syntheses, physico-chemical characterizations (TGA, ATR-FTIR, DLS, TEM).

- 2015 Six-month internship at Feyecon Carbon Dioxide Technologies at Weesp, The Netherlands. Supervisor: Dr. Bram Pape. Subject: Hydrophilic encapsulation of a novel triblock copolymer for drug delivery.
Use of supercritical carbon dioxide, SAS process, PGSS process.
- 2014 Five-month internship at the *Institute for Molecular Science* at Okazaki, Japan. Supervisor: Ass. Pr. Yuji Furutani. Subject: Investigation of molecular mechanisms of membrane proteins by using ATR-FTIR spectroscopy.
Use of ATR-FTIR, buffer-exchange system, biological procedure.

Academic field: activities and publications

- Teaching Tutor of experimental courses in thermochemistry at Paris Descartes University of Pharmacy (Undergraduate students, 64h)
Presentation of the small animals *in vivo* imaging platform of UTCBS to Master student (M2 BIM Paris Descartes, PSL ITI, 2017 Chinese summer school “Chimie et Biologie du Médicament pour la Santé”)
- Publications
- “Chemically engineered persistent luminescence nanoprobes for bioimaging”, Lécuyer et al., *Theranostics*, **6**(13), 2488-2523, 2016. (IF: 11.556 (2021), citations: 127)
 - “Degradation of ZnGa₂O₄: Cr³⁺ luminescent nanoparticles in lysosomal-like medium”, Lécuyer et al. *Nanoscale*, 2020,**12**, 1967-1974. (IF: 7.790 (2020), citations: 8)
 - “Physico-chemical characterizations of Cr doped persistent luminescence nanoparticles”, Lécuyer et al., *Conference paper SPIE BIOS*, 2016 (citations: 3).
 - “Persistent luminescence nanoparticles functionalized by polymers bearing phosphonic acid anchors: synthesis, characterization, and *in vivo* behavior”, Lécuyer et al., *Nanoscale*, 2022, **14**, 1386-1394. (IF: 7.790 (2020), citations: 2)
 - “Fate and biological impact of persistent luminescence nanoparticles after injection in mice: a one-year follow-up”, Lécuyer et al., submitted (*Nanoscale*).
 - “*In vitro* behavior, toxicity, and degradation of Ag₂S nanoparticles for temperature imaging”, Lécuyer et al., in preparation
 - “Coating persistent luminescence nanoparticles with hydrophilic polymers for *in vivo* imaging”, Liu et al., *Front. Chem.*, **8**, article 584114, 2020. (IF: 4,62 (2020), citations: 1)
 - “Imaging and therapeutic applications of persistent luminescent nanomaterials”, Liu et al., *Adv. DrugDeliv. Rev.*, 2018, **138**, 193-210. (IF: 15,47 (2020), citations: 145)
 - “LaAlO₃: Cr³⁺, Sm³⁺: Nano-perovskite with persistent luminescent luminescence for *in vivo* optical imaging”, Pellerin et al., *Journal of Luminescence*, **202**, 83-88, 2018. (IF: 3,599 (2020), citations: 27)
 - “Zwitterionic functionalization of persistent luminescence nanoparticles: physico-chemical characterizations and *in vivo* biodistribution studies in mice”, Dassonville, Lécuyer et al., submitted (Int. J. Pharm.).
- Congress
- SFnano 2016, Paris, poster presentation: “Persistent luminescence nanoparticles for *in vivo* imaging: physicochemical characterization, functionalization and fate”.
- SFnano 2017, Bordeaux, oral presentation: “Persistent luminescence nanoparticles for *in vivo* imaging: a better understanding of their fate”.
- WMIC 2018, Seattle, poster presentation: “Persistent luminescence nanoparticles for *in vivo* imaging: a better understanding of their fate”.

Role President of the “Association des Thésards de Chimie ParisTech” (ATCP) 2016 board. Organization of social events, organization of a one-day congress.
Elected PhD student’s representant in the scientific committee of Paris University faculty of pharmacy (2017-2018)
Member of the UTCBS laboratory council (2016-2018)
Reviewing for Small peer reviewed journal

Research activities in relation with companies

Nanolmmunotech (Spain) Active collaboration on the NanoTBTech project, sending of nanomaterials for toxicity assessment, determination of the endotoxin concentration to improve the functionalization steps (publication in preparation).

Biospace Lab (France) Development of optical imaging systems for *in vivo* studies. Improvement of NPs excitation by implementing the Biospace PhotoImager with LED’s ramps (PhD work). Improvement and validation of a novel SWIR imaging system for temperature reading: final *in vivo* “proof of concept” evaluation (Postdoctoral work).

Specific Polymers (France) Development of a new co-block polymer bearing phosphonic acid anchor groups: development of a functionalization method on ZnGa₂O₄ NPs, characterization, and feed back to the company for synthesis improvement.

Languages and computer science

Languages English: C1
German: B2
Italian: A1 – ongoing learning
French: mother tongue.

Computer science Pack Office – programming in C (beginner) – using chemistry software (MestReNova, ChemDraw, Igor) – Photoshop, InDesign, Illustrator – Image J – Biospace M3 vision – Malvern Software – Prism – LAX – Jeol TEM Software.