

CURRICULUM VITAE

Caroline de Gracia Lux, PhD

PERSONAL INFORMATION

Name: Caroline de Gracia Lux, PhD
Place of Birth: Saint Cyr l'Ecole (France)
Year Of Birth:
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EDUCATION

<u>Year</u>	<u>Degree</u>	<u>Field of Study</u>	<u>Institution</u>
2005	BSc	Chemistry and Physics	University of Upper Alsace (France)
2007	Engineer	Chemistry	Mulhouse National School of Chemistry (France)
2007	MSc	Material Chemistry	University of Upper Alsace (France)
2010	PhD	Chemistry	University of Strasbourg, Institute Charles Sadron, Strasbourg, France
2015	MBA	Business and Management	Rady School of Management, University of California, San Diego

POSTDOCTORAL TRAINING

<u>Year(s)</u>	<u>Training</u>	<u>Specialty/Discipline</u>	<u>Institution</u>
2011-2015	Fellowship	Chemistry	University of California San Diego, San Diego, CA

FACULTY ACADEMIC APPOINTMENTS

<u>Year(s)</u>	<u>Academic Title</u>	<u>Academic Department</u>	<u>Academic Institution</u>
2015-2017	Instructor	Radiology	University of Texas Southwestern Medical School, Dallas, TX
2017-now	Assistant Professor	Radiology	University of Texas Southwestern Medical School, Dallas, TX
2018-now	Assistant Professor	Biomedical Engineering Graduate Program	University of Texas Southwestern Medical School, Dallas, TX

HONORS AND AWARDS

<u>Year</u>	<u>Name of Award</u>	<u>Awarding Organization</u>
2007	Engineering Doctorate Fellowship – BDI	CNRS and Region Alsace
2008	Travel Fellowship Sciences	French Society of Chemistry and Doctoral School of Chemical
2009	Innovating Project "Doctoriales d' Alsace"	CNRS and Region Alsace
2009	Travel Fellowship	Groupe Francais du Fluor

OTHER PROFESSIONAL POSITIONS

<u>Year(s)</u>	<u>Position Title</u>	<u>Institution</u>
2005-2006	Engineer in Training	Clariant (Now Archroma), Basel (Switzerland)
2006-2007	Undergraduate	University of Strasbourg, Institute Charles Sadron (France)
2011-2015	Postdoctoral Scholar	University of California, San Diego
2014-2015	Falling Walls Lab organizer	University of California, San Diego

COMMITTEE SERVICE

<u>Years</u>	<u>Position title</u>	<u>Name of Committee</u>	<u>Institution or Organization</u>
2018-now	SURF Mentor	Mentor of SURF student, Gabrielle Tremonti (Southern Methodist University)	UT Southwestern Medical Center
2018-now	STARS Mentor	Mentor of STARS student, Sofiu Ogunbiyi (Timberview High School)	UT Southwestern Medical Center

PROFESSIONAL SOCIETIES

<u>Year(s)</u>	<u>Society Name</u>
2011-now	American Chemical Society
2017-now	American Institute of Ultrasound in Medicine
2017-now	Materials Research Society
2018-now	Society for Biomaterials
2018-now	Harold C. Simmons Comprehensive Cancer Center
2018-now	World Molecular Imaging Society

INVITED LECTURES, TEACHING AND PRESENTATIONS

National

<u>Year(s)</u>	<u>Presentation Title or Course Name</u>
2008	de Gracia Lux C, Krafft MP. Fluorocarbon/Hydrocarbon Tetrablock Amphiphiles: Synthesis, Mesophase Investigation and Behavior at Interfaces, 2nd EuChemS Congress, Turin (Italie), September 16-20.
2009	de Gracia Lux C, Krafft MP. Non-Polar Gemini Amphiphiles, Journées de l'IPCMS, Strasbourg (France), May 4-6. de Gracia Lux C, Krafft MP. Design, Elaboration and Study of Nano-compartmented self-assemblies and Interfacial films obtained by new Architectures of Semi-Fluorinated Alkanes, Journées de l'ICS/LIPHT, Albé (France), June 29-30. de Gracia Lux C, Krafft MP. Langmuir-Blodgett and Spin-Coated Films Formed by Non-Polar Fluorophilic/Lipophilic Gemini Amphiphile, 19th ISFC-ISoFT Congress, Jackson Hole (WY), August 23-28. de Gracia Lux C, Krafft MP. Non-Polar Fluorophilic/Lipophilic Gemini Amphiphile : Synthesis, Solid State Structure and Behavior at Interfaces, 19th ISFC-ISoFT Congress, Jackson Hole (WY), August 23-28.
2012	de Gracia Lux C, Almutairi A. Controlled Degradation and Release of Polymer Based Nanoparticles, 243rd American Chemical Society National Meeting, San Diego (CA), March 25-29.
2013	de Gracia Lux C.; Joshi-Barr S.; Nguyen T.; Mahmoud E.; Schopf E.; Fomina N.; Almutairi A.; Biocompatible Polymeric Nanoparticles Degrade and Release Cargo in Response to Biologically Relevant Levels of Hydrogen Peroxide, 245th American Chemical Society National Meeting, New Orleans (LA), April 7-11. de Gracia Lux C.; Fomina N.; Olejniczak J.; Joshi-Barr S.; Viger M. L.; Almutairi A.; Triggered Release via Controlled Degradation of Polymeric Nanoparticles in Response to Biologically Relevant Levels of Hydrogen Peroxide or Light, Post-Doctoral Research Symposium, UCSD, La Jolla (CA), September 13. de Gracia Lux C.; Fomina N.; Olejniczak J.; Joshi-Barr S.; Viger M. L.; Almutairi A.; Triggered Release via Controlled Degradation of Polymeric Nanoparticles in Response to Biologically Relevant Levels of Hydrogen Peroxide or Light, 11th International Nanomedicine and Drug Delivery Symposium, La Jolla (CA), October 25-27. Inflammation-triggered release from Polymeric Nanoparticles, Environmental and Genomics Society, Monterey, CA, September 21-25 (Invited lecture).
2014	de Gracia Lux C., Olejniczak J., Joshi-Barr S., Fomina N., Viger M.L., Almutairi A.; Triggered Release via Controlled Degradation of Polymeric Nanoparticles in response to biologically relevant levels of hydrogen peroxide or light, 247th American Chemical Society National Meeting, Dallas (TX), March 16-20.
2015	de Gracia Lux C.; Lux J.; Collet G.; He S.; Chan M.; Olejniczak J.; Almutairi A.; Nature-inspired intramolecular cyclization for fast light-triggered nanogel degradation, 249th American Chemical Society National Meeting, Denver (CO), March 22-26.
2017	de Gracia Lux C.; Vezeridis A.M., Lux J., Armstrong A.M., Sirsi S., Hoyt K., Mattrey R.; Direct formulation of stabilized and monodisperse perfluorobutane nanodroplets with controlled acoustic vaporization threshold, 2017 American Institute of Ultrasound in Medicine Annual Convention, Orlando (FL), March 25-29.
2017	de Gracia Lux C.; Lux J., Vezeridis A.M., Armstrong A.M., Sirsi S., Hoyt K., Mattrey R.; Direct Formulation of Monodisperse Superheated Nanodroplets as Activatable Ultrasound Contrast Agent, 91 st American Chemical Society Colloid and Surface Science Symposium July 9-12.
2018	de Gracia Lux C.; Lux J., Armstrong A.M., Grozinger W., Mattrey R.; Perfluorocarbon nanoscale emulsions: New formulation and applications as activatable ultrasound contrast agents, 92 nd American Chemical Society Colloid and Surface Science Symposium June 10-13.

- 2018 NIBIB Roundtable Discussion on Immunoengineering at the Society for Biomaterials Meeting, April 11th.
- 2018 de Gracia Lux C., Lux J., Vezeridis A.M., Armstrong A.M., Mattrey R.; Novel Method for the Formation of Monodisperse Superheated Perfluorocarbon Nanodroplets Yields Activatable Ultrasound Contrast Agents with Improved In Vitro Properties, World Molecular Imaging Congress, September 12-15.

Local

Year(s) Presentation Title or Course Name

- 2016 Smart materials for on-demand drug delivery or imaging, Dean Sherry's group meeting, UT Dallas, TX, April 27th (**Invited lecture**)
- 2016 Exploiting Disease microenvironments as triggers for drug delivery and diagnostics, Joint program in biomedical engineering with UTA & UTD and the cancer imaging program, UTSW, TX, June 24th (**Invited lecture**)
- 2018 New Formulation of Activatable Ultrasound Contrast Agents: Toward Diseased Tissue Imaging and Drug Delivery Past the Interstitial Space, Women in Science and Medicine celebration, February 7th (**invited poster**)
- 2018 Non-viral CAR T-Cell Immunotherapy of Acute Lymphoblastic Leukemia Using MB-based Ultrasound Gene Delivery (poster presented by Parastoo Sabaeifard, awarded as the Best Basic Science Poster Presentation), Research Day, May 1st.
- 2018 New Responsive Ultrasound Contrast Agent for Imaging and Therapy, QP-SURF seminar series, July 13th (**Invited lecture**)

BIBLIOGRAPHY OF SCHOLARLY PUBLICATIONS

Original Research Articles

- 1 Bessy E, Marmey P, de Gracia C, Gavat O, Collin D, Martinoty P, Verpoort T, Lutz PJ. Mechanical Properties of Poly(ethylene oxide) Macromonomers Based Hydrogels, *Polymer Preprints* 2008, 49 (1), 851.
- 2 de Gracia Lux C, Krafft MP, Non-Polar Gemini Amphiphiles Self-Assemble into Stacked Layers of Nano-Objects, *Chem Eur J*, 2010, 16, 11539-11542.
- 3 de Gracia Lux C, Gallani JL, Waton G, Krafft MP, Compression of Self-Assembled Nano-Objects-2D/3D Transitions in Films of (Perfluoroalkyl)Alkanes – Persistence of an Organized Array of Surface Micelles, *Chem Eur J*, 2010, 16, 7186-7198.
- 4 de Gracia Lux C, Gallani JL, Waton G, Krafft MP. Stacking of Self-Assembled Surface Micelles in Ultrathin Films, *Chem Phys Chem*, 2012, 13, 1454-1462.
- 5 de Gracia Lux C, McFearin CL, Joshi-Barr S, Sankaranarayanan J, Fomina N, Almutairi A. Single UV or Near IR Triggering Event Leads to Polymer Degradation into Small Molecules, *ACS Macro Lett.*, 2012, 1, 922-926.
- 6 de Gracia Lux C, Joshi-Barr S, Nguyen T, Mahmoud E, Schopf E, Fomina N, Almutairi A. Biocompatible Polymeric Nanoparticles Degrade and Release Cargo in Response to Biologically Relevant Levels of Hydrogen Peroxide, *J Am Chem Soc*, 2012, 134, 15758-15764.
- 7 de Gracia Lux C, Donnio B, Heinrich B, Krafft MP. Thermal Behavior and High- and Low- Temperature Phase Structures of Gemini Fluorocarbon/Hydrocarbon Diblocks, *Langmuir*, 2013, 29, 5325-5336.
- 8 de Gracia Lux C, Almutairi A. Intramolecular Cyclization for Stimuli-Controlled Depolymerization of Polycaprolactone Particles Leading to Disassembly and Payload Release, *ACS Macro Lett.*, 2013, 2, 432-435.
- 9 de Gracia Lux C, Olejniczak J, Fomina N, Almutairi A. Intramolecular Cyclization Assistance for Fast Degradation of Ornithine-Based Poly(ester amide)s, *J Polym Sci Part A*, 2013, 51, 3783-3790.

- 10 Viger ML, Sankaranarayanan J, de Gracia Lux C, Chan M, Almutairi A. Collective Activation of MRI Agents via Encapsulation and Disease-Triggered Release, *J Am Chem Soc*, 2013, 135, 7847-7850.
- 11 Joshi-Barr S, de Gracia Lux C, Mahmoud E, Almutairi A. Exploiting Oxidative Microenvironments in the Body as Triggers for Drug Delivery Systems, Antioxidants and Redox Signaling, 2013 DOI:10.1089/ars.2013.5754.
- 12 Viger ML, Sheng W, Doré K, Alhasan AH, Carling CJ, Lux J, de Gracia Lux C, Grossman M, Malinow R, Almutairi A. Near-Infrared-Induced Heating of Confined Water in Polymeric Particles for Efficient Payload Release, *ACS Nano*, 2014, 8, 4815-4826.
- 13 Van H, Luo J, Zhu J, Patel S, Boone A, Mahmoud E, McFearin C, Olejniczak J, de Gracia Lux C, Lux J, Fomina N, Huynhe M, Zhang K, Almutairi A. Light-responsive nanoparticle depot to control release of a small molecule angiogenesis inhibitor in the posterior segment of the eye, *Journal of Controlled Release*, 2015, 200, 71-77.
- 14 de Gracia Lux C, Lux J, Collet G, He S, Chan M, Olejniczak J, Foucault-Collet A, Almutairi A. Short Soluble Coumarin Crosslinkers for Light Controlled Release of Cells and Proteins from Hydrogels, *Biomacromolecules* 2015, 16 (10), 3286–3296. PMID: 26349005.
- 15 de Gracia Lux C, Vezeridis A M, Lux J, Armstrong A M, Sirsi S, Hoyt K, Mattrey R F. Novel Method for Formation of Monodisperse Superheated Perfluorocarbon Nanodroplets as Activatable Ultrasound Contrast Agents, *RSC Advances*, 2017, 7, 48561-48568.

PATENT

- 2014** de Gracia Lux C., Almutairi A., ; Biocompatible Polymeric Nanoparticles Degrade and Release Cargo in Response to Biologically Relevant Levels of Hydrogen Peroxide, Serial No.: 14/199,876 (**Patent**).
- de Gracia Lux C., Lux J., Vezeridis A.M., Mattrey R.F.; Nanodroplets with improved properties (**Provisional application, Patent UTSW:016USP1**).
- 2018 de Gracia Lux C., Lux J., Mattrey R.F.; Microbubble and nanobubble expansion using perfluorocarbon nanodroplets: A new strategy for enhanced ultrasound imaging and therapy (IPQ submitted on May 1, 2018 – UTSD: 3399)
- 2018 Gao Z., de Gracia Lux C., Mattrey R.F.; Cell Isolation Sensitivity using Buoyancy (IPQ submitted on May 16, 2018 – UTSD: 3411)

GRANT SUPPORT FUNDED AND UNFUNDED PROJECTS

Funded Research Projects

Grantor: Department of Defense – U.S. Army Medical Research and Materiel Command (W81XWH-17-1-0401)
Title of Project: Eliminating ex Vivo Manipulation and Viral Transfection of T Cells in CAR T–Cell Immunotherapy of B-Cell Malignancies Using Ultrasound-Based Gene Delivery

Investigator Role: PI

Total Award Amount: \$634,249
Year(s): 2017-2019

Grantor: Harold C. Simmons Comprehensive Cancer Center

Title of Project: Non-invasive Microvascular Occlusion of HCC using Targeted Microbubble Expansion

Investigator Role: PI

Total Award Amount: \$49,753
Year(s): 2018

NARRATIVE REPORT

Caroline de Gracia Lux received her Ph.D. in Chemistry from the University of Strasbourg under the mentorship of Marie Pierre

Krafft, Ph.D. synthesizing and evaluating new classes of fluorinated surfactants to promote self-assembly and compartmentalized systems for material science applications.

Following her Ph.D., she completed postdoctoral training at UCSD focusing on biocompatible materials for theranostic applications. She was instrumental in the success of various projects on polymeric materials that degrade and release their contents in response to either abnormal biological conditions or by remote optical activation. She concurrently completed a Micro-MBA program at UCSD (Rady School of Management) that focused on communication, leadership in high performance teams, finance, strategy and marketing.

She recently joined the newly established Translational Research in Ultrasound Theranostics program at UT Southwestern Dept of Radiology. Her current research interest is combining creative synthetic chemistry and formulation to develop ultrasound contrast agent with sophisticated architecture aimed to address a wide range of challenges in cancer imaging and treatment.

Ongoing projects focus on the stabilization of low boiling point perfluorocarbon emulsion using a low interfacial tension approach, the development of new activatable ultrasound contrast agents and multimodal imaging probes.