



Dr. Aurore Fraix

Assistant Professor

PhotoChemLab

Department of Drug Sciences
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Date of Birth: 12/12/1983

Nationality: French

Languages:

French (first language)

English (fluent)

Italian (fluent)

ORCID: 0000-0002-8328-3290

Research in numbers:

h-index: 19 (WoS-sept 2020)

897 citations (WoS-sept 2020)

■ 57 articles on peer-reviewed international journals

■ 1 book chapter

■ 1 patent

■ 10 Cover Pages in International Scientific Journals

■ 3 invited talks

■ 18 participations in international meeting with an oral contribution

Research topics

At the interface between chemistry and bio-medicine, my research activity is focus on the conception, preparation and characterisation of innovative drug delivery systems. Especially, the use of light as trigger to control the desired bio-activity is one of the key aspects of this research. Profuse and versatile molecular and supra molecular platforms (e.g. cyclodextrin derivatives) have been studied to achieve the control release of nitric oxide and/or singlet oxygen as active species concomitantly with the release of conventional drug or fluorescent properties for theranostic. Another topic of research is the development of innovative lipids to confer attractive properties to liposomes, such as enhance activity for gene/drug delivery or anti-bacterial properties.

Scientific Career

Since 01/12/2017	Assistant Professor Department of Drug Sciences - University of Catania (Italy) Habilitation to Associate Professor in 2018
From 21/06/2017 To 04/03/2013	Post-doctoral researcher Department of Drug Sciences - University of Catania (Italy) Funding by the AIRC, the Italian Foundation for research against cancer and National Italian projects (PON Hippocrates, PRIN 2010-2011)
From 01/12/2011 To 31/11/2012	Experienced Researcher Marie Curie ITN- Project CYCLON N°237962 Department of Drug Sciences - University of Catania (Italy) <i>Design, preparation and characterization of cyclodextrins based nanoparticles with photoactivatable functionalities for a multimodal anticancer therapy.</i>
From 01/09/2011 To 31/11/2011	Post-doctoral fellow funding AFM (French Muscular Dystrophy Association) Université de Bretagne Occidentale – Brest (France) - CEMCA- UMR 6521
From 01/10/2010 To 31/08/2011	Teaching and Research Assistant ATER Université de Bretagne Occidentale –Brest (France)- CEMCA- UMR 6521
From 01/10/2007 To 30/09/2010	Doctorate Funding by the French Ministry of Higher Education and Research Université de Bretagne Occidentale – Brest (France)- CEMCA- UMR 6521

Education

- 02/12/2010 **PhD in Molecular Chemistry**
(Université de Bretagne Occidentale – CEMCA-UMR 6521 – France)
Title: Synthesis, characterization and formulation of new sulfurated phospholipid vectors for an application in gene delivery
- 2007 **Master of Science (Master 2) in Fine Chemistry and Analytical Chemistry** (Université de Bretagne Occidentale -Brest -France)

Funded Research Projects

- March 2019 and January 2020 **Visiting scientist** (Université de Bretagne Occidentale - CEMCA-UMR 6521 – France)
2 stays founded by the Université de Bretagne Occidentale to develop new innovative projects of pharmaceutical and biomedical interest.
- 2018 **Associated investigator** (Local unit) in the PHOLIE project: Photoresponsive host-guest functional systems in liposomes. Three years project funded by PRIN an Italian national competitive funding.
- 2018 **Participation as *Core Unit*** in the AIRC -19859 project funded by the Italian Foundation for research against cancer.

Awards

- 2019 Best oral communication price during the UK-IT joint meeting on Photochemistry 2019.
- 13/05/2014 Presentation of PhD works during a session of the French Academy of Sciences (13th of May 2014)
- 2013 Young Researcher Award (first prize - health & wellness category) received from the Regional Council of Brittany, France, 2013
- Since 2013 10 Cover Pages in International Scientific Journals
Chem. Commun., **2020**, issue 47. *Chem. Asian J.*, **2015**, issue 5.
Chem. Eur J., **2019**, issue 29. *J. Mat.Chem. B*, **2014**, issue 22.
Chem. Eur J., **2018**, issue 30. *Chem. Commun.*, **2013**, issue 40.
J. Mater. Chem. B, **2018**, 2. *Nanoscale*, **2015**, issue 13.
ACS Med. Chem. Lett., **2017**, issue 3. *Chem. Asian J.*, **2013**, issue 11.

Refereing Activity for Peer-reviewed Journals

- 2020 Nanomaterials – Applied Sciences – ChemMedChem
- 2019 ACS Applied Materials & Interfaces - Photochemistry and Photobiology Sciences – Catalyst – Nanomaterials
- 2018 Nanoscale - ACS Applied Materials & Interfaces - Journals of Materials Chemistry B - New Journal of Chemistry
- 2017 Chemistry an European journal - Physical Chemistry Chemical Physics - ACS Sustainable Chemistry & Engineering - Photochemistry and Photobiology – Nanomedicine
- 2016 Journal of Colloid and Interface Sciences

Organization Activities and Scientific Dissemination

Since 2015	Member of the European Photochemistry Association (2015– to date)
2018-2019	Participation to the European Researchers' Night.
February 2018	Selected for the local final of Famelab 2018. https://www.youtube.com/watch?v=oZM1kWhGwAc
December 2015	Recording for “Science Slam” by Zammù TV. https://www.youtube.com/watch?v=_TynysHp2OU
November 2015	Talk during the “Euraxess roadshow” - Catania.
2010	Member of the Organizing Committee of the international conference SECO 47 (Semaine d’Etude de Chimie Organique), Seignosse, France, 2010
From 2007	Co-organization of several events for mediatisation of chemistry: organization of conferences for general public, activities for children, University open days.
To 2010	2009-2010: President of the local young chemist association of the French Chemical Society (SCF) – Brest-France

Participation to Education Programs

Since 2018	Teacher of General and Inorganic Chemistry, Department of Biomedical and Biotechnological Sciences - University of Catania (Italy)
2016-2018	Speaker in 17 training meetings for high school teachers PNLs-chemistry-Catania (Italy) - https://www.youtube.com/watch?v=GilxGfJho14&t=198s
2010-2011	Teaching assistant (ATER) (96 h / year) Université de Bretagne Occidentale -France
2007-2010	Teaching assistant , (64 h / year, for 3 years) Université de Bretagne Occidentale -France

§: equal contribution

1) NO release regulated by doxorubicin as the green light-harvesting antenna

Fraix, A.;[§] Parisi, C.;[§] Failla, M.;[§] Chegaev, K.; Spyrakis, F.; Lazzarato, L.; Fruttero, R.; Gasco, A.; Sortino, S.
Chem. Commun., 2020, 56, 6332-6335.

Inside cover page

2) A high-performing metal free photoactivatable no donor with a green fluorescent reporter

Parisi, C.;[§] Seggio, M.;[§] Fraix, A.;[§] Sortino, S.

ChemPhotoChem, 2020, Accepted DOI: 10.1002/cptc.202000100

3) DNA-targeted NO release photoregulated by green light.

Parisi, C.;[§] Fraix, A.;[§] Guglielmo, S.;[§] Spyrakis, F.; Rolando, B.; Lazzarato, L.; Fruttero, R.; Gasco, A.; Sortino, S.
Chem. Eur. J., 2020, in press DOI: 10.1002/chem.202001538

4) Enhancing doxorubicin anticancer activity with a novel polymeric platform photoreleasing nitric oxide

Sodano, F.; Cavanagh, R. J.; Pearce, A. K.; Lazzarato, L.; Rolando, B.; Fraix, A.; Abelha, T. F.; Vasey, C. E.;
Alexander, C.; Taresco, V.; Sortino, S.

Biomaterials Science, 2020, 8, 1329-1344.

5) Overcoming doxorubicin resistance with lipid-polymer hybrid nanoparticles photoreleasing nitric oxide

Fraix, A.;[§] Conte, C.;[§] Gazzano, E.;[§] Riganti, C.; Quaglia, F.; Sortino, S.

Molecular Pharmaceutics, 2020, 17, 2135-2144.

6) Photodegradation of antibiotics by noncovalent porphyrin-functionalized TiO₂ in water for the bacterial antibiotic resistance risk management

Gaeta, M.; Sanfilippo, G.; Fraix, A.; Sortino, G.; Barcellona, M.; Oliveri Conti, G. Fragala, M. E.; Ferrante, M.;
Purrello, R.; D'Urso, A

Int. J. Mol. Sci., 2020, 21, 3775.

7) One-step photochemical green synthesis of water-dispersible Ag, Au, and Au@Ag core-shell nanoparticles

Perez-Lloret, M.; Fraix, A.; Petralia, S.; Conoci, S.; Tafani, V.; Cutrone, G.; Vargas-Berenguel, A.; Gref, R.; Sortino, S.

Chem. Eur. J., 2019, 25, 14638-14643.

8) Visible light-activatable multicargo microemulsions with bimodal photobactericidal action and dual colour fluorescence

Fraix, A.;[§] Catanzano, O.;[§] Di Bari, I.; Conte, C.; Seggio, M.; Parisi, C.; Nostro, A.; Ginestra, G.; Quaglia, F.; Sortino, S.

J. Mater. Chem. B, 2019, 7, 5257-5264.

9) Fluorescent nitric oxide photodonors based on BODIPY and rhodamine antennae

Parisi, C.; Failla, M.; Fraix, A.; Rolando, B.; Gianquinto, E.; Spyrakis, F.; Gazzano, E.; Riganti, C.; Lazzarato, L.;
Fruttero, R.; Gasco, A.; Sortino, S.

Chem. Eur. J., 2019, 25, 11080 –11084.

10) Three-bullets" loaded mesoporous silica nanoparticles for combined photo/chemotherapy

Tessaro, A. L.; Fraix A.; Pedrozo da Silva A. C.; Gazzano E.; Riganti C.; Sortino, S.

Nanomaterials, 2019, 9, 823.

- 11) A calix[4]arene-based ternary supramolecular nanoassembly with improved fluoroquinolone photostability and enhanced NO photorelease
Fraix, A.;[§] Afonso, D.;[§] Consoli, G. M. L.; Sortino, S.
Photochem. Photobiol. Sci., 2019, 18, 2216.
- 12) A comprehensive investigation of amino grafted mesoporous silica nanoparticles supramolecular assemblies to host photoactive chlorophyll a in aqueous solution
Rizzi, V.; Gubitosa, J.; Fini, P.; Fanelli, F.; Fraix, A.; Sortino, S.; Agostiano, A.; De Cola, L.; Nacci, A.; Cosma, P.
J. Photochem. Photobiol. A, 2019, 377, 149-158.
- 13) A molecular hybrid producing simultaneously singlet oxygen and nitric oxide by single photon excitation with green light
Parisi, C.; Failla, M.; Fraix, A.; Rescifina, A.; Rolando, B.; Lazzarato, L.; Cardile, V.; Graziano, A. C. E.; Fruttero, R.; Gasco, A.; Sortino, S.
Bioorg. Chem., 2019, 85, 18-22.
- 14) A phototherapeutic fluorescent β -cyclodextrin branched polymer delivering nitric oxide
Malanga, M.; Seggio, M.; Kirejev, V.; Fraix, A.; Di Bari, I.; Fenyvesi, E.; Ericson, M. B.; Sortino, S.
Biomater. Sci., 2019, 7, 2272-2276.
- 15) A three-color fluorescent supramolecular nanoassembly of phototherapeutics activable by two-photon excitation with near-infrared light
Fraix, A.;[§] Kirejev, V.;[§] Malanga, M.; Fenyvesi, E.; Beni, S.; Ericson, M. B.; Sortino, S.
Chem. Eur. J., 2019, 25, 7091-7095.
Cover feature
- 16) Singlet oxygen photo-production by perylene bisimide derivative Langmuir-Schaefer films for photodynamic therapy applications
Semeraro, P.; Syrgiannis, Z.; Bettini, S.; Giancane, G.; Guerra, F.; Fraix, A.; Bucci, C.; Sortino, S.; Prato, M.; Valli, L.
J. Colloid. Interface Sci., 2019, 553, 390-401.
- 17) Combination of PDT photosensitizers with NO photodonors
Fraix, A.; Sortino, S.
Photochem. Photobiol. Sci., 2018, 17, 1709-1727.
- 18) Light-Controlled Simultaneous "On Demand" Release of Cytotoxic Combinations for Bimodal Killing of Cancer Cells
Tessaro, A. L.; Fraix, A.; Failla, M.; Cardile, V.; Graziano, A. C. E.; Esteveo, B. M.; Rescifina, A.; Sortino, S.
Chem. Eur. J., 2018, 24, 7664-7670.
Cover feature
- 19) Monitoring the release of a NO photodonor from polymer nanoparticles via Forster resonance energy transfer and two-photon fluorescence imaging
Conte, C.;[§] Fraix, A.;[§] Thomsen, H.; Ungaro, F.; Cardile, V.; Graziano, A. C. E.; Ericson, M. B.; Quaglia, F.; Sortino, S.
J. Mat. Chem. B, 2018, 6, 249-256.
Inside front cover
- 20) A molecular hybrid for mitochondria-targeted no photodelivery
Sodano, F.; Gazzano, E.; Fraix, A.; Rolando, B.; Lazzarato, L.; Russo, M.; Blangetti, M.; Riganti, C.; Fruttero, R.; Gasco, A.; Sortino, S.
ChemMedChem, 2018, 13, 87-96.

- 21) Shedding light on surface exposition of poly(ethylene glycol) and folate targeting units on nanoparticles of poly(ϵ -caprolactone) diblock copolymers: Beyond a paradigm
Venuta, A.; Moret, F.; Dal Poggetto, G.; Esposito, D.; Fraix, A.; Avitabile, C.; Ungaro, F.; Malinconico, M.; Sortino, S.; Romanelli, A.; Laurienzo, P.; Reddi, E.; Quaglia, F.
Eur. J. Pharm. Sci., 2018, 111, 177-185
- 22) Multivalent mesoporous silica nanoparticles photo-delivering nitric oxide with carbon dots as fluorescence reporters
Afonso, D.; Valetti, S.; Fraix, A.; Bascetta, C.; Petralia, S.; Conoci, S.; Feiler, A.; Sortino, S.
Nanoscale, 2017, 9, 13404-13408.
- 23) Novel sigma receptor ligand-nitric oxide photodonors: molecular hybrids for double-targeted antiproliferative effect
Amata, E.; Dichiaro, M.; Arena, E.; Pittala, V.; Pistara, V.; Cardile, V.; Graziano, A. C. E.; Fraix, A.; Marrazzo, A.; Sortino, S.; Prezzavento, O.
J. Med. Chem., 2017, 60, 9531-9544.
- 24) Poly(ethylene oxide)/hydroxypropyl- β -cyclodextrin films for oromucosal delivery of hydrophilic drugs
D'Angelo, I.; Fraix, A.; Ungaro, F.; Quaglia, F.; Miro, A.
Int. J. Pharm., 2017, 531, 606-613.
- 25) A nonmetal-containing nitric oxide donor activated with single-photon green light
Blangetti, M.; Fraix, A.; Lazzarato, L.; Marini, E.; Rolando, B.; Sodano, F.; Fruttero, R.; Gasco, A.; Sortino, S.
Chem. Eur. J., 2017, 23, 9026-9029.
- 26) Light-regulated NO release as a novel strategy to overcome doxorubicin multidrug resistance.
Chegaev, K.; Fraix, A.; Gazzano, E.; Abd-Ellatef, G. E. F.; Blangetti, M.; Rolando, B.; Conoci, S.; Riganti, C.; Fruttero, R.; Gasco, A.; Sortino, S.
ACS Med. Chem. Lett., 2017, 8, 361-365.
Cover page
- 27) Pluronic P123/F127 mixed micelles delivering sorafenib and its combination with verteporfin in cancer cells.
Pellosi, D. S.; Moret, F.; Fraix, A.; Marino, N.; Maiolino, S.; Gaio, E.; Hioka, N.; Reddi, E.; Sortino, S.; Quaglia, F.
Int. J. Nanomedicine, 2016, 11, 4479-4494.
- 28) Supramolecular activation of the photodynamic properties of porphyrinoid photosensitizers by calix[4]arene nanoassemblies.
Di Bari, I.; Fraix, A.; Picciotto, R.; Blanco, A. R.; Petralia, S.; Conoci, S.; Granata, G.; Consoli, G. M. L.; Sortino, S.
RSC Adv., 2016, 6, 105573-105577.
- 29) NO photoreleaser-deoxyadenosine and -bile acid derivative bioconjugates as novel potential photochemotherapeutics.
Navacchia, M. L.; Fraix, A.; Chinaglia, N.; Gallerani, E.; Perrone, D.; Cardile, V.; Graziano, A. C. E.; Capobianco, M. L.; Sortino, S.
ACS Med. Chem. Lett. 2016, 7, 939-943.
- 30) Light-tunable generation of singlet oxygen and nitric oxide with a bichromophoric molecular hybrid: a bimodal approach to killing cancer cells.
Fraix, A.; Blangetti, M.; Guglielmo, S.; Lazzarato, L.; Marino, N.; Cardile, V.; Graziano, A. C. E.; Manet, I.; Fruttero, R.; Gasco, A.; Sortino, S.
ChemMedChem, 2016, 11, 1371-1379.

31) Supramolecular polymer networks based on calix[5]arene chained poly(p-phenyleneethynylene) and C60 fulleropyrrolidine.

Fraix, A.; Torrisi, V.; Marletta, G.; Sortino, S.; Mineo, P. G.; Tomaselli, G. A.; Ballistreri, F. P.; Trusso Sfrassetto, G.; Pappalardo, A.

Supramol. Chem., 2016, 28, 485-492.

32) Molecular interactions, characterization and photoactivity of chlorophyll a/chitosan/2-HP- β -cyclodextrin composite films as functional and active surfaces for ROS production.

Rizzi, V.; Fini, P.; Fanelli, F.; Placido, T.; Semeraro, P.; Sibillano, T.; Fraix, A.; Sortino, S.; Agostiano, A.; Giannini, C.; Cosma, P.

Food Hydrocolloids, 2016, 58, 98-112.

33) Polymer nanoparticles with electrostatically loaded multicargo for combined cancer phototherapy.

Fraix, A.; Manet, I.; Ballestri, M.; Guerrini, A.; Dambruoso, P.; Sotgiu, G.; Varchi, G. Camerin, M.; Coppellotti, O.; Sortino, S.

J. Mater. Chem. B, 2015, 3, 3001-3010.

34) Photoactivable platforms for nitric oxide delivery with fluorescence imaging.

Fraix, A.; Sortino, S.

Chem. Asian J., 2015, 10, 1116-1125.

35) Polystyrene nanofiber material for visible-light-driven dual antibacterial action via simultaneous photogeneration of NO and O₂ (1Δg).

Dolansky, J.; Henke, P.; Kubat, P.; Fraix, A.; Sortino, S.; Mosinger, J.

ACS Appl. Mater. Inter., 2015, 7, 22980-22989.

36) Rose bengal-photosensitized oxidation of 4-thiothymidine in aqueous medium: evidence for the reaction of the nucleoside with singlet state oxygen.

Rizzi, V.; Losito, I.; Ventrella, A.; Fini, P.; Fraix, A.; Sortino, S.; Agostiano, A.; Longobardi, F.; Cosma, P.

Phys. Chem. Chem. Phys., 2015, 17, 26307-26319.

37) Synthesis, characterization and photo-bactericidal activity of silanized xanthene-modified bacterial cellulose membranes.

Hettegger, H.; Gorfer, M.; Sortino, S.; Fraix, A.; Bandian, D.; Rohrer, C.; Harreither, W.; Potthast, A.; Rosenau, T.

Cellulose, 2015, 22, 3291-3304.

38) Supramolecular nanoreactors for intracellular singlet-oxygen sensitization.

Swaminathan, S.; Fowley, C. Thapaliya, E. R.; McCaughan, B.; Tang, S.; Fraix, A.; Captain, B.; Sortino, S.; Callan, J. F.; Raymo, F. M.

Nanoscale, 2015, 7, 14071-14079.

39) Hyaluronan-decorated polymer nanoparticles targeting the CD44 receptor for the combined photo/chemotherapy of cancer.

Maiolino, S.; Moret, F.; Conte, C.; Fraix, A.; Tirino, P.; Ungaro, F.; Sortino, S.; Reddi, E.; Quaglia, F.

Nanoscale, 2015, 7, 5643-5653.

Back cover page

40) Carbon quantum dot-NO photoreleaser nanohybrids for two-photon phototherapy of hypoxic tumors.

Fowley, C.; McHale, A. P.; McCaughan, B.; Fraix, A.; Sortino, S.; Callan, J. F.

Chem. Commun., 2015, 51, 81-84.

41) A multicomponent gel for nitric oxide photorelease with fluorescence reporting.

Fraix, A.; Kandoth, N.; Gref, Ruxandra; Sortino, S.

Asian J. Org. Chem., 2015, 4, 256-261.

- 42) A multi-photoresponsive molecular hybrid for dual-modal photoinactivation of cancer cells.
Fraix, A.; Guglielmo, S.; Cardile, V.; Graziano, A.C.E.; Gref, R.; Rolando, B.; Fruttero, R.; Gasco, A.; Sortino, S.
RSC Adv., 2014, 4, 44827-44836.
- 43) A multi-photoresponsive supramolecular hydrogel with dual-colour fluorescence and dual-modal photodynamic action.
Fraix, A.; Gref, R.; Sortino, S.
J. Mat. Chem. B, 2014, 2, 3443-3449.
Back cover page
- 44) Photoresponsive polymer nanocarriers with multifunctional cargo.
Swaminathan, S.; Garcia-Amorós, J.; Fraix, A.; Kandoth, N.; Sortino, S.; Raymo, F.M.
Chem. Soc. Rev., 2014, 43, 4167-4178.
- 45) Nitric oxide photoreleasing nanoconstructs with multiple photofunctionalities
Fraix, A.; Kandoth, N.; Sortino, S.
Specialist Periodical Reports in Photochemistry: volume 41, 2013, 302–318.
- 46) A multifunctional bichromophoric nanoaggregate for fluorescence imaging and simultaneous photogeneration of RNOS and ROS.
Fraix, A.; Gonçalves, A.R.L.; Cardile, V.; Graziano, A.C.E.; Theodossiou, T.A.; Yannakopoulou, K.; Sortino, S.
Chem. Asian J., 2013, 8, 2634-2641.
Back Cover Page.
- 47) An engineered nanoplatfom for bimodal anticancer phototherapy with dual-color fluorescence detection of sensitizers
Fraix, A.; Kandoth, N.; Manet, I.; Cardile, V.; Graziano, A.C.E.; Gref, R.; Sortino, S.
Chem. Commun., 2013, 49, 4459-4461.
Inside back cover page
- 48) Arsonium-containing lipophosphoramides, poly-functional nano-carriers for simultaneous antibacterial action and eukaryotic cell transfection.
Le Gall, T.; Berchel, M.; Le Hir, S.; Fraix, A.; Salaün, J.Y.; Férec, C.; Lehn, P.; Jaffrès, P.A.; Montier, T.
Adv. Healthcare Mater., 2013, 2, 1513-1524.
- 49) Cationic lipophosphoramidates with two disulfide motifs: synthesis, behavior in reductive media and gene transfection activity.
Fraix, A.; Le Gall, T.; Berchel, M.; Denis, C.; Lehn, P.; Montier, T.; Jaffrès, P.A.
Org. Biomol. Chem., 2013, 11, 1650-1658.
- 50) Photoinduced fluorescence activation and nitric oxide release with biocompatible polymer nanoparticles.
Deniz, E.; Kandoth, N.; Fraix, A.; Cardile, V.; Graziano, A.C.E.; Lo Furno, D.; Gref, R.; Raymo, F.M.; Sortino, S.
Chem. Eur. J., 2012, 18, 15782-15787.
- 51) A host-guest supramolecular complex with photoregulated delivery of nitric oxide and fluorescence imaging in cancer cells.
Kandoth, N.; Malanga, M.; Fraix, A.; Jicsinszky, L.; Fenyvesi, E.; Parisi, T.; Colao, I.; Sciortino, M. T.; Sortino, S.
Chem. Asian J., 2012, 7, 2888-2894.
- 52) Gene transfection properties of a lipophosphoramidate derivative with two phytanyl chains.
Lindberg, M.; Carmoy, N.; Le Gall, T.; Fraix, A.; Berchel, M.; Lorilleux, C.; Couthon-Gourvès, H.; Bellaud, P.; Fautrel, A.; Jaffrès, P.A.; Lehn, P.; Montier, T.
Biomaterials, 2012, 33, 6240-6253.

53) Lipothiophosphoramidates for gene delivery: critical role of cationic polar headgroup.
Fraix, A.; Montier, T.; Le Gall, T.; Sevrain, C. M.; Carmoy, N.; Lindberg, M. F.; Lehn, P.; Jaffrès, P.A.
Org. Biomol. Chem., 2012, 10, 2051-2058.

54) Cationic lipo-thiophosphoramidates for in vitro gene delivery: synthesis, physico-chemical characterizations and transfection assays - comparison with lipo-phosphoramidates.
Fraix, A.; Montier, T.; Carmoy, N.; Loizeau, D.; Burel-Deschamps, L.; Le Gall, T.; Giamarchi, P.; Couthon-Gourvès, H.; Haelters, J.P.; Lehn, P.; Jaffrès, P.A.
Org. Biomol. Chem., 2011, 9, 2422-2432.

55) Construction of monoanionic S,N,S-pincer ligand with a pyrrole core by sequential [1,2] phospho-fries rearrangement. Characterization of a palladium and silver coordination complexes.
Fraix, A.; Lutz, M.; Spek, A. L.; Klein Gebbink, R. J. M.; van Koten, G.; Salaün, J.Y.; Jaffrès, P.A.
Dalton Trans., 2010, 39, 2942-2946.

56) Highly efficient gene transfer into hepatocyte-like HepaRG cells: new means for drug metabolism and toxicity studies.
Laurent, V.; Fraix, A.; Montier, T.; Cammas-Marion, S.; Ribault, C.; Benvegna, T.; Jaffrès, P.A.; Loyer, P.
Biotechnol. J., 2010, 5, 314-320.

57) Synthesis of O,O-Diethyl arylthiophosphonate from O-Aryl-O,O-diethylthiophosphate.
Dieng, T.; Fraix, A.; Salaün, J.Y.; Dez, I.; Klein Gebbink, R. J. M.; van Koten, G.; Jaffrès, P.A.
Synlett, 2008, 20, 3121-3124.

Book chapter

1) Phototherapeutic release of nitric oxide with engineered nanoconstructs.
Fraix, A.; Marino, N.; Sortino, S.
Top.Curr. Chem., 2015, 370, 225-257.

Patent

1) Lipothiophosphoramides for gene delivery.
Jaffrès, P.A.; Fraix, A.; Montier, T.; Lehn, P.
US patent 2010 application, 61/389,959, PCT/EP2011/06742

Invited talks

1) Multi-photoresponsive systems for therapeutic applications
JED3M- Brest (France)
19 February 2019

2) Multi-photoresponsive systems for therapeutic applications
Seminaire CEMCA-UMR 6521- Université de Bretagne Occidentale (France)
2 may 2018

3) Utilisation de l'ADN comme médicament, développement de nouveaux vecteurs phospholipidiques.
session of the French Academy of Sciences
13 may 2017

Participations in meeting with an oral contribution:

- 1) "Three-bullets" loaded mesoporous silica nanoparticles for combined photo/chemotherapy
Fraix A.; Tessaro, A. L.; Pedrozo da Silva A. C.; Gazzano E.; Riganti C.; Sortino, S.
NanoBio&Med 2019 International Conference, Barcelona (Spain), November 2019.
- 2) A three-color fluorescent supramolecular nanoassembly for bimodal phototherapy imaged by two-photon excitation with a single NIR light
Fraix, A.; Kirejev, V.; Malanga, M.; Ericson M. B.; Sortino, S.
UK-IT joint meeting on Photochemistry 2019, Lipari (Italy), June 2019.
Premio per la migliore presentazione orale
- 3) Light-regulated NO release as a novel strategy to overcome doxorubicin multidrug resistance
Fraix, A.; Chegaev, K.; Gazzano, E.; Abd-Elatef, G. E. F.; Blangetti, M.; Rolando, B.; Conoci, S.; Riganti, C.; Fruttero, R.; Gasco, A.; Sortino, S.
27th PhotoIUPAC Symposium, Dublin (Ireland), July 2018.
- 4) Light-regulated NO release as a novel strategy to overcome doxorubicin multidrug resistance
Fraix, A.; Chegaev, K.; Gazzano, E.; Abd-Elatef, G. E. F.; Blangetti, M.; Rolando, B.; Conoci, S.; Riganti, C.; Fruttero, R.; Gasco, A.; Sortino, S.
Congresso Congiunto Sicilia-Calabria SCI 2018, Catania (Italy), February 2018
- 5) Core-shell polymer nanoparticles for combined photo/chemotherapy of cancers overexpressing CD44-receptor.
Maiolino, S.; Moret, F.; Conte, C.; Fraix, A.; Tirino, P.; Ungaro, F.; Reddi, E.; Sortino, S.; Quaglia, F.
Italian Photochemistry meeting 2015, Bologna (Italy), december 2015.
- 6) Polymer nanoparticles with electrostatically loaded multicargo for combined cancer phototherapy.
Fraix, A.; Manet, I.; Ballestri, M.; Guerrini, A.; Dambruoso, P.; Sotgiu, G.; Varchi, G.; Camerin, M.; Coppellotti, O.; Sortino, S.
NanoBioApp, Barcelona (Spain), september 2015.
- 7) Multi-photoresponsive supramolecular hydrogels with therapeutic and imaging properties.
Fraix, A.; Gref, R.; Sortino, S.
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- 8) A multifunctional bichromophoric nanoaggregate for fluorescence imaging and simultaneous photogeneration of RNOS and ROS.
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