Martino Calamai

CNR National Institute of Optics,Largo Fermi 6, Florence 50125, Italy
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EDUCATION AND POSITIONS

CNR May 2012-present
Permanent research position first at the Institute of Neuroscience and lately at the National Institute of Optics, in collaboration with LENS. Studying the molecular basis of neurodegenerative diseases by means of advanced microscopy techniques.

University of Florence Apr 2012-May 2012
Temporary research position at the Department of Biochemistry in collaboration with LENS. Studying the molecular basis of dialysis-associated amyloidosis by means of single molecule tracking *in vivo*.

University of Florence Jan 2009-Mar 2012
Postdoctoral fellowship at LENS - European Laboratory for Non-Linear Spectroscopy under the supervision of Prof. Francesco Pavone. Studying the molecular basis of Alzheimer's disease by means of single molecule tracking *in vivo*.

Ecole Normale Superieure of Paris Dec 2006-Dec 2008
Postdoctoral fellowship at the Department of Biology under the supervision of Prof. Antoine Triller and Dott. Christian Vannier. Investigated synaptic plasticity *in vivo* through single particle tracking methods.

University of Cambridge Oct 2002-Nov 2006
PhD degree at the Department of Chemistry under the supervision of Professor Christopher M Dobson. Investigated protein misfolding and aggregation *in vitro* by using biophysical methods.

University of Florence Nov 2001-Sep 2002
Collaboration contract at the Department of Biochemistry, Laboratory of Prof. Massimo Stefani and Prof. Fabrizio Chiti. Investigated protein misfolding and aggregation *in vitro* by using biophysical methods.

University of Florence Oct 1996-Oct 2001
Graduation degree in Biology, following a biomolecular specialisation, with top marks and honors (110/110 cum laude).

Liceo Galileo Galilei of Florence Sep 1991-Jun 1996
High school degree in Classical Studies.

LIST OF PUBLICATIONS

- Biocompatible and Printable Ionotronic Sensing Materials Based on Silk Fibroin and Soluble Plant-Derived Polyphenols ACS Omega in Press **IF 4.1**

- Capitini C, Pesce L, Fani G, Mazzamuto G, Genovese M, Franceschini A, Paoli P, Pieraccini G, Zasloff M, Chiti F, Pavone FS, **Calamai M.** Studying the trafficking of labeled trodusquemine and its application as nerve marker for light-sheet and expansion microscopy. **FASEB J.** 2022 Dec;36(12):e22655. doi: 10.1096/fj.202201276R. **IF 5.8**

- Capitini C, Feo F, Caciotti A, Tonin R, Lulli M, Coviello D, Guerrini R, **Calamai M**, Morrone A. Fluorescent In Situ Staining and Flow Cytometric Procedures as New Pre-Diagnostic Tests for Sialidosis, GM1 Gangliosidosis and Niemann-Pick Type C. **Biomedicines.** 2022 Aug 12;10(8):1962. doi: 10.3390/biomedicines10081962. *Equal last author contribution.* **IF 4.8**

- Chiesa I, De Maria C, Ceccarini MR, Mussolin L, Coletta R, Morabito A, Tonin R, **Calamai M**, Morrone A, Beccari T, Valentini L. 3D Printing Silk-Based Bioresorbable Piezoelectric Self-Adhesive Holey Structures for In Vivo Monitoring on Soft Tissues. **ACS Appl Mater Interfaces.** 2022 May 4;14(17):19253-19264. doi: 10.1021/acsami.2c04078. **IF 10.4**

- Cardellini J, Caselli L, Lavagna E, Salassi S, Amenitsch H, **Calamai M**, Montis C, Rossi G, Berti D. Membrane Phase Drives the Assembly of Gold Nanoparticles on Biomimetic Lipid Bilayers. **J Phys Chem C Nanomater Interfaces**. 2022 Mar 10;126(9):4483-4494. doi: 10.1021/acs.jpcc.1c08914. **IF 4.1**

- Errico S, Ramshini H, Capitini C, Canale C, Spaziano M, Barbut D, **Calamai M**, Zasloff M, Oropesa-Nuñez R, Vendruscolo M, Chiti F. Quantitative Measurement of the Affinity of Toxic and Nontoxic Misfolded Protein Oligomers for Lipid Bilayers and of its Modulation by Lipid Composition and Trodusquemine. **ACS Chem Neurosci**. 2021 Sep 1;12(17):3189-3202. doi: 10.1021/acschemneuro.1c00327. **IF 5.8**

- Bon SB, Chiesa I, Degli Esposti M, Morselli D, Fabbri P, De Maria C, Morabito A, Coletta R, **Calamai M**, Pavone FS, Tonin R, Morrone A, Giorgi G, Valentini L. Carbon Nanotubes/Regenerated Silk Composite as a Three-Dimensional Printable Bio-Adhesive Ink with Self-Powering Properties. **ACS Appl Mater Interfaces**. 2021 May 12;13(18):21007-21017. doi: 10.1021/acsami.1c03288. **IF 10.4**

- Dallari C, Capitini C, **Calamai M**, Trabocchi A, Pavone FS, Credi C. Gold Nanostars Bioconjugation for Selective Targeting and SERS Detection of Biofluids. **Nanomaterials** (Basel). 2021 Mar 8;11(3):665. doi: 10.3390/nano11030665. **IF 5.7**

- Errico S , Lucchesi G , Odino D , Muscat S , Capitini C , Bugelli C , Canale C , Ferrando R , Grasso G , Barbut D , **Calamai M** , Danani A , Zasloff M , Relini A , Caminati G , Vendruscolo M , Chiti F . Making biological membrane resistant to the toxicity of misfolded protein oligomers: a lesson from trodusquemine. **Nanoscale**. 2020 Nov 19;12(44):22596-22614. doi: 10.1039/d0nr05285j. **IF 8.3**

- Capitini C, Fani G, Vivoli Vega M, Penco A, Canale C, Cabrita LD, **Calamai M**, Christodoulou J, Relini A, Chiti F. Full-length TDP-43 and its C-terminal domain form filaments in vitro having non-amyloid properties. **Amyloid**. 2021 Mar;28(1):56-65. doi: 10.1080/13506129.2020.1826425. **IF 4.0**

- Tonin R, Caciotti A, Procopio E, Fischetto R, Deodato F, Mancardi MM, di Rocco M, Ardissone A, Salviati A, Marangi A, Strisciuglio A, Mangone G, Casini A, Ricci S, Fiumara A, Parini R, Pavone FS, Guerrini R, **Calamai M***, Morrone M. Pre-diagnosing and managing patients with GM1 gangliosidosis and related disorders by the evaluation of GM1 ganglioside content. **Scientific Reports**. 2019 Nov 27;9(1):17684. doi: 10.1038/s41598-019-53995-5. *Equal last author contribution.* **IF 5.0**

- Ferrantini C, Pioner JM, Martella D, Coppini R, Piroddi N, Paoli P, **Calamai M**, Pavone FS, Wiersma DS, Tesi C, Cerbai E, Poggesi C, Sacconi L, Parmeggiani C. Development of Light-Responsive Liquid Crystalline Elastomers to Assist Cardiac Contraction. **Circ Res.** 2019 Apr 12;124(8):e44-e54. **IF: 17.4**

- **Calamai M***, Pavone FS. Quantifying the Proteolytic Cleavage of Plasma Membrane Proteins in Living Cells. **Curr Protoc Cell Biol**. 2018 Aug 7:e58. doi: 10.1002/cpcb.58.

- Gardini L, **Calamai M**, Hatakeyama H, Kanzaki M, Capitanio M, Pavone FS. Three-Dimensional Tracking of Quantum Dot-Conjugated Molecules in Living Cells. **Methods Mol Biol**. 2018;1814:425-448. doi: 10.1007/978-1-4939-8591-3_26.

-Parenti N, Del Grosso A, Antoni C, Cecchini M, Corradetti R, Pavone FS , **Calamai M*.** Direct imaging of APP proteolysis in living cells. **Peer J**, 2017 Apr 12;5:e3086. IF: **3.1**

-Leri M, Bemporad F, Oropesa-Nuñez R, Canale C, **Calamai M**, Nosi D, Ramazzotti M, Giorgetti S, Pavone FS, Bellotti V, Stefani M, Bucciantini M. Molecular insights into cell toxicity of a novel familial amyloidogenic variant of β2-microglobulin. **J Cell Mol Med**. 2016 Mar 18. IF: **5.3**

- Calamai M*, Evangelisti E, Cascella R, Parenti N, Cecchi C, Stefani M, Pavone FS. Single molecule experiments emphasize GM1 as a key player of the different cytotoxicity of structurally distinct Aβ1-42 oligomers. **BBA Biomembranes**. 2016 Feb;1858(2): 386–392; on line December 2015. IF: **4.0**

-Bisel B, Pavone FS, **Calamai M***. GM1 and GM2 gangliosides: recent developments. **BioMolecular Concepts**. Mar 2014; 5(1): 87-93. **IF: 3.2**

-Bisel B, **Calamai M**, Vanzi F, Pavone FS. Decoupling Polarization of the Golgi Apparatus and GM1 in the Plasma Membrane. **Plos One**. 2013 Dec 2;8(12):e80446. IF: **3.7**

- Calamai M*, Pavone FS. Partitioning and confinement of GM1 ganglioside induced by amyloid aggregates. **FEBS letters.** 2013 May 2;587(9):1385-91. IF: **4.1**

- Scotti E, **Calamai M**, Goulbourne CN, Zhang L, Hong C, Lin RR, Choi J, Pilch PF, Fong LG, Zou P, Ting AY, Pavone FS, Young SG, Tontonoz P. IDOL stimulates clathrin-independent endocytosis and MVB-mediated lysosomal degradation of the LDLR. **Mol and Cell Biol** 2013 Apr;33(8):1503-14. IF: **5.1**

- Bucciantini M, Nosi D, Forzan M, Russo E, **Calamai M**, Pieri L, Formigli L, Quercioli F, Soria S, Pavone F, Savistchenko J, Melki R, Stefani M. Toxic effects of amyloid fibrils on cell membranes: the importance of ganglioside GM1. **FASEB J.** 2012 Feb;26(2):818-31. IF: **5.8**

- Calamai M*, Pavone FS. Single molecule tracking analysis reveals that the surface mobility of amyloid oligomers is driven by their conformational structure.
J Am Chem Soc. 2011 Aug 10;133(31):12001-8. IF: **16.4**

- Haselwandter CA, **Calamai M**, Kardar M, Triller A, da Silveira RA. Formation and stability of synaptic receptor domains.
Phys Rev Lett. 2011 Jun 10;106(23):238104. IF: **9.2**

- Calamai M, Specht CG, Heller J, Vannier C and Triller A. Gephyrin oligomerization controls GlyR mobility and synaptic clustering. **Journal of Neuroscience**. 2009 Jun 17;29(24):7639-48. IF: **6.7**

- Calamai M, Tartaglia GG; Vendruscolo M, Chiti F and Dobson CM. Mutational Analysis of the Aggregation-Prone and Disaggregation-Prone Regions of Acylphosphatase.
Journal of Molecular Biology. 2009 Apr 10;387(4):965-74. Epub 2008 Sep 12. IF: **5.5**

- Calamai M, Kumita JR, Mifsud J, Parrini C, Ramazzotti M, Ramponi G, Taddei N, Chiti F and Dobson CM. Nature and Significance of the Interactions between Amyloid Fibrils and Biological Polyelectrolytes. ***Biochemistry.*** 2006 Oct 24;45(42):12806-15. IF: **3.2**

- **Calamai M**, Chiti F & Dobson CM. Amyloid Fibril Formation can Proceed from Different Conformations of a Partially Unfolded Protein. ***Biophysical Journal.*** 2005 Dec;89(6):4201-10. IF: **4.0**

- Plakoutsi G, Bemporad F, **Calamai M**, Taddei N, Dobson CM & Chiti F. Evidence for a Mechanism of Amyloid Formation Involving Molecular Reorganisation within Native-like Precursor Aggregates.***Journal of Molecular Biology***. 2005 Aug 26;351(4):910-22. IF: **5.5**

- **Calamai M**, Canale C, Relini A, Stefani M, Chiti F & Dobson CM. Reversal of Protein Aggregation Provides Evidence for Multiple Aggregated States. ***Journal of Molecular Biology***. 2005 Feb 18;346(2):603-16. IF: **5.5**

- Bemporad F, Capanni C, **Calamai M**, Tutino ML, Stefani M & Chiti F. Studying the folding process of the acylphosphatase from Sulfolobus solfataricus. A comparative analysis with other proteins from the same superfamily.
Biochemistry. 2004 Jul 20;43(28):9116-26. IF: **3.2**

- **Calamai M**, Taddei N, Stefani M, Ramponi G & Chiti F. Relative influence of hydrophobicity and net charge in the aggregation of two homologous proteins.
Biochemistry. 2003 Dec 30;42(51):15078-83. IF: **3.2**

- Chiti F, **Calamai M**, Taddei N, Stefani M, Ramponi G & Dobson CM. Studies of the aggregation of mutant proteins in vitro provide insights into the genetics of amyloid diseases.***Proc Natl Acad Sci U S A***. 2002 Dec 10;99 Suppl 4:16419-26 (This article was picked and evaluated by Faculty of 1000). IF: **12.3**

*= Corresponding author

BOOK CHAPTERS

- Mascaro, AL, Silvestri, L, Sacconi, L, **Calamai, M** and Pavone, FS,"Neurophotonics" in **The Optics Encyclopedia, Wiley** VCH. DOI: 10.1002/9783527600441.oe1009. Jun 26

2015.

- Calamai, M, Canale, C, Relini, A., ...Chiti, F., Dobson, C.M. Disaggregation experiments as a tool to detect protofibrillar intermediates. **Amyloid and Amyloidosis**, 2004, pp. 18–20

PAST AND CURRENT RESEARCH WORK

The research that I carried out during my PhD at the University of Cambridge has been generally directed at studying the features of the **amyloid aggregation process** by performing *in vitro* experiments and by using **biophysical, biomolecular and bioinformatic methodologies**. Goals of my past experience include the elucidation of the role of electrostatic repulsions in the aggregation process and an exhaustive study on the disassembly process of preformed aggregates under physiological conditions.
Due to the link between protein aggregation and the disruption of synaptic plasticity in vivo, and subsequent impairment of memory in the development of Alzheimer's disease, I have decided to shift to **neurobiology**. During my postdoctoral experience at the Ecole Normale Supérieure of Paris I have studied the mechanisms through which neurotransmitter receptors are stabilised at the synapse by using state of the art **real-time single particle tracking in living neurons**. My current research is focused at studying possible **applications of biophotonic instruments to problems related to human pathologies**.

AWARDS AND RESEARCH SUPPORT

-2002 Collaboration contract with the Dept of Biochemistry, Florence
-2002-2005 **Marie Curie Training Network fellowship** (HPRN-CT-2002-00241)
-2004 Protein Society Finn Wold Travel Award to attend the 18th Symposium of the Protein Society in San Diego
-2004-2005 St John's College travel grants
-2005 FEBS Fellowship to attend FEBS Forum for Young Scientists and the 30th FEBS Congress in Budapest
-2005 **FEBS and IUBMB Youth Excellence Award** sponsored by New England Biolabs
- 2006 FEBS Fellowship to attend EMBO-FEBS workshop on Amyloid formation in Florence
-2006-2008 **FEBS Long-term Fellowship** Total funding: **52.000,00 €**
-2008 Italian Society of Biochemistry (SIB) Award during the 53rd National Meeting of "Italian Society of Biochemistry and Molecular Biology"
-2009 One year Fellowship from the University of Florence
-2009 SIB Fellowship to attend the 34th FEBS Congress in Prague
-2009 IUBMB Fellowship to attend IUBMB Young Scientists Program and the 21st IUBMB and 12th FAOBMB Congress in Shanghai
-2010 **Marie Curie IEF fellowship** (FP7-PEOPLE-2009-IEF-254791) "Dissecting Alzheimer's disease at a single molecule level" Total funding: **164.458,60 €**
-2010 Società Italiana di Biofisica Pura ed Applicata (SIBPA) Fellowship to attend the XX Congress of SIBPA

-2010 Travel Fellowship to attend the 2010 International Conference on Alzheimer's Disease (ICAD)
-2011 Participant to the project selected for **PRIN 2009** funding (2009KN2FBM_002) "Determinanti molecolari alla base delle alterazioni funzionali di cardomiociti nella cardiomiopatia amilotica familiare" Unit funding: **46.731,00 €**
-2011 Research unit responsible within a project selected for **FIRB Futuro in Ricerca 2010** funding (RBFR109EOS_004) "Dalle conoscenze di base riguardanti la dinamica dell'autoaggregazione della Beta2 microglobulina alla scoperta di nuovi inibitori dell'amiloidogenesi" Unit funding: **221.500,00 €**
- 2014 Research unit responsible within the project from the Italian Ministry of Health selected for **Giovani ricercatori 2012-2013** funding "Automated digital scanning and diagnosis of tissues using multimodal non-linear optical microscopy" (GR-2011-02349626) Unit funding: **96.500,00 €**
-2016 Participant to the project selected for **ENTECASSA 2015** "Caratterizzazione delle cascate di segnalazione e di trascrizione indotte dall'interazione membrane-amiloide" Total funding: **50.000,00 €**
-2016 Research unit responsible within the project **H2020 NMBP-2016-2017** "Nose to Brain Delivery of NG-101 via the Olfactory Region for the Regenerative Treatment of Multiple Sclerosis Using Novel Multi-functional Biomaterials Combined with a Medical Device" (N2B-Patch GA No. 721098) Unit funding: **227.500,00 €**
-2017 Participant to the project selected for **ENTECASSA 2016** "Una nuova microscopia di forza per svelare i meccanismi di differenziazione delle cellule staminali umane" Total funding: **55.000,00 €**
-2020 Research unit responsible within the project **BANDO RICERCA SALUTE REGIONE TOSCANA 2018** "Late onset Lysosomal Storage Disorders (LSDs) in the differential diagnosis of neurodegenerative diseases: development of new diagnostic procedures and focus on potential pharmacological chaperones (PCs)" Unit funding: **80.000,00 €**
- 2020 Research unit responsible within the project **H2020 MSCA ITN 2020** "Nose-to-Brain Delivery of Biopharmaceuticals: A design-based approach for efficient drug delivery systems" (EU project 956977 - Bio2Brain) Unit funding: **261.499,68 €**
- 2022 Participant to the project selected within the **"Problem-driven" call funded by the University of Florence** "Fluorinated pharmacological chaperones for Parkinson disease in drug-delivery studies" Total funding: **75.000,00 €**

SELECTED ORAL PRESENTATIONS
-2010 20th National Congress of the Italian Society for Pure and Applied Biophysics (SIBPA) *Diffusion of amyloid oligomers on the plasma membrane is highly dependent on their conformational structure*
-2010 Biophysical Society 54th Annual Meeting - *Dissecting the membrane dynamics of amyloid oligomers at a single molecule level*
-2011 8th European Biophysics Congress (EBSA) *Amyloid-like aggregates alter the membrane mobility of GM1 gangliosides*
-2013 Marie Curie Actions: On the last lap to Horizon 2020 - *Biophotonics: a new approach to investigate neurodegenerative diseases*
-2015 Denothe Young - *"Super-resolution microscopy and single molecule tracking in living cells"*
-2018 Training on Advanced optical microscopy methods in Biomedicine - *"Alzheimer's disease from a single molecule/single cell perspective"*
-2021 Workshop "Steroid-polyamines against neurodegeneration – from the physics-chemistry to the clinical trials" - *'Trafficking of fluorescently labeled trodusquemine in living cells'*

REVIEW EXPERIENCES

- Grant referee **expert for EC H2020 and Horizon Europe Marie Curie IF (2014-present)**
- Grant referee **expert for EC H2020 and Horizon Europe Spreading Excellence and Widening (2017-present)**
- Grant referee **for EC H2020 and Horizon Europe Marie Curie ETN/ITN (2019-present)**
- Grant referee **expert for EC H2020 COST (2020)**
- Grant referee expert for several Italian and European Institutions (Universitá di Verona, Università degli Studi dell'Insubria, Czech Science Foundation, Bulgarian Science Foundation)

-Reviewer for several international peer reviewed journals (Science Advances, Langmuir, Journal of Molecular Biology, Protein Science, Biochemistry, Advanced Optical Technologies, Nutrients, International Review of Cell and Molecular Biology, Scientific Reports, Biochimica et Biophysica Acta, FASEB Journal)**.**