

## **Curriculum Dr. Francisco Melo**

**Dr. Francisco Melo** is a Physics Professor at Universidad de Santiago de Chile. His main research areas are Nonlinear Physics and Soft Materials. He developed pioneering experiments on the collective behavior of particulate systems and has made contributions to the understanding of crumpling folding and fracture of diverse materials, including thin films, foams and cohesive granular materials. In the latest years, he has been involved in the study of the mechanical properties of biomolecules and lipid membranes as well as biomaterials growth by means of atomic force techniques (AFM). He has also undertaken single molecules experiments using magnetic tweezers and micro-cantilevers as force sensors. Presently, he studies how the action of forces in the range of pN correlates to specific molecular bonds disruption or conformational changes in macromolecules (DNA and proteins) through the combination of force spectroscopy with spectral methods, including fluorescence and enhanced Raman spectroscopy. He has authored more than 130 articles, published in the main journals of his field, receiving about 5500 citations.

Dr. Melo was awarded with the "Presidential Chair" granted by the President of the Republic and the "Best Academic Award" of Universidad de Santiago.

He has been Invited Professor at several European Institutions, including Ecole Normale Supérieure de Lyon, Ecole de Supérieure de Physique et Chimie Industrielle de Paris and Université de Montpellier, France.

--Google scholar link:

[https://scholar.google.cl/citations?hl=es&user=8fuNPLIAAAAJ&view\\_op=list\\_works&sortby=pubdate](https://scholar.google.cl/citations?hl=es&user=8fuNPLIAAAAJ&view_op=list_works&sortby=pubdate)

Portal del investigador Conicyt:

[https://investigadores.conicyt.cl/es/public\\_search/researcher?id=18150](https://investigadores.conicyt.cl/es/public_search/researcher?id=18150)

- **Academic and Professional Experience.**

- Post-Doctoral Fellow at CNLD, Department of Physics, UT Austin, USA, 1992-1993.
- Diplôme de Doctorat, École Normale Supérieure de Lyon, U. Claude Bernard Lyon 1, France, 1991.
- D.E.A. Adv. Studies in Material Science and Surfaces, U. Claude Bernard Lyon 1, France, 1987.
- Master in Physics, Condensed Matter, University of Santiago, Chile, 1986.

- **Appointments:**

- 2011-invited professor at Ecole de Physique et Chimie Industrielle de Paris, France
- 2010-invited professor at Ecole Normale Supérieure de Lyon, France.
- 2009-invited professor at Université de Montpellier, France.
- 1998-present Full Professor, Physics Department University of Santiago, Chile.
- 1994-1998 Associate Professor, Physics Department University of Santiago, Chile.
- 1990-1995 Chargé de Recherche II-I, CNRS. France at ENS of Lyon.

- **Main Administration activities:**

- From 2000 to 2002 and 2006 to 2008, elected head of the Physics Department of U. de Santiago.
- Vice President of Panetarium Foundation, 2009 to date
- Board Member of Explora Program of Conicyt-Chile 2002-2006
- Consultant for Educational Ministry "Mecesup Program", from 2000 to 2010
- Scientific Advisor of "Museo Interactivo Mirador", from 2002 to 2006
- Scientific Advisor of "Planetarium", 2007-2009

- Scientific Consulting for; Flows in Underground Mining and Rock Assessment (IM2 Codelco).
- Director of Center for Soft Matter Research, SMAT-C, since 2016, [www.smat-c.cl](http://www.smat-c.cl)
- Director of “Pedagogía en Física y Matemática”, since 2017.

- **Editor of scientific journals**

- Paper in Physics
- Powders and Grains

- **Honors and awards:**

- Presidential Chair in Sciences 1997-2000: Awarded by the Chilean President and a jury composed the Nobel Prize in Physics David Gross and the Nobel Prize in Chemistry Rudolph A. Marcus.
- Best Academic of Universidad de Santiago, 1999. Academic award for outstanding achievements.

- **Scientific outreach.**

- Exhibits and audiovisuals

- Creator of “Granular Materials: From grains to avalanches” exhibit, (2002): more than 150.000 visitors. This exhibit has been in Brazil and has travelled along Chile, for several years, during the “Science Week”, Explora-Conicyt. See google: “Material granular del grano a la avalanche: <https://cutt.ly/nhaRmxw>” It has been an attraction at the main cultural sites of Santiago, Museo Interactivo Mirador MIM, Matucana-100, Main subway Station Plaza Baquedano.

- Scientific Director of Exhibits “Hundred years under Einstein light”. More than 5000 visitors, 2005.
- Creator of Exhibits “Before Einstein: Fluids and Structures” (2005). (Science Museum, MIM).
- Co-creator (Chilean part) of International exhibits “Jeux des Grains, Tas de Sable et Avalanches”, 2004, in collaboration with the Centre-Sciences Orléans, France, under the sponsorship of the Nobel Prize in Physics P. G. de Gennes and the former President of ENS-Paris E. Guyon. Presented in several cities of France and Africa and widely cited, see google.
- Codirector Exhibits: “Play of the Atoms, New Materials”, Conicyt, 2006;
- Scientific Director of Exhibits: “The light and colour of the Universe”, Planetario Usach, 2006.
- Scientific Director of audiovisual “Lights from Infinity: Uncovering the Colours of the Universe”, Planetario Usach, 2006.

- Interviews:

- Interview at local TV Channel “*Estamos en Contacto*”, Canal 13 Cable. November 2005.
  - Interviews at TV shows and news about scientific issues. (Scientific American, Science, among others, and local newspapers).
  - Interviews at local newspaper about Covid-19 propagation (La Tercera and el Mercurio) Agosto 2020.
  - Interview at communication office of UMayor about progression of Covid-19, Junio 2020.

- Invited articles:

- F. Melo**, P. Umbanhowar and H.L. Swinney. “*Qué son los oscilones*”. Invited article in **Investigación y Ciencia** (Spanish translation of **Scientific American**), (1997).

- F. Melo** and E. Cerda “*El arrugado del papel. Un punto de vista físico*”. Invited article in **Investigación y Ciencia** (Spanish translation of **Scientific American**), 286, 42, (2000).

- **Latest International Conferences Organized:**

- ICU 2009 International Conference on Ultrasonics. Santiago Chile. (Org.). >300 participants.
- Southern Workshop in Granular Materials 2005, 2007, 2009, 2012 (Org.). Pucón, Reñaca, Viña del Mar, Puerto Varas, respectively. About 100 participants every two years.
- Frontiers in Material Science (Co-org.). Reñaca 2004, 2006, 2008. >200 participants, every two years.
- V Latin American Symposium on SPM. (LASPM) (Co-organized), 2009, Viña del Mar, Chile.
- Since 2006, member of the board of “Powders and Grains”, one of the largest conferences on granular matter, taking place every 4 years.
- A sequence of 5 workshops “Approaching research to high school” for science teachers at high school. Teaching based on research and evidence observation, STEAM and SCTA. A maximum of 30 participants (in groups of 5) per workshop 2018-2019.

- **Invited Talks:** (More than 30 invited talks in Conferences, since 1990).

Most important conferences invited as lecturer

- Workshop on Nonequilibrium Structures.  
Santiago, Chile, December 1993
- Summer School Mobile Particulate Systems.  
Cargese, France, July 1994
- Dynamics Processes in Granular Materials.  
Chicago, USA, May 1995
- Workshop on Nonequilibrium Structures  
Valparaíso, Chile, December 1995
- Dynamics Days  
France, Julio, 1995
- Conference on Statistical Methods in Space-time Chaos  
Firenze, Italy, September 1995
- New Trend in Acoustic  
Santiago, Chile, December 1996
- Latin American Workshop on Nonlinear Phenomena.  
Granado, Brazil, 1997.
- International Workshop on Nonlinear Dynamic and Acoustic  
Barcelone, Spain, March 1997
- Research Workshop on Condensed Matter Physics (**course lecturer**)  
**ICTP Trieste, Italy, June 1997**
- Summer School: Elasticity and Viscoelasticity (**course lecturer**)  
Cargese, France, June 1997
- Workshop on Nonequilibrium Structures  
Valparaíso, Chile, December 1997
- American Physical Society Meeting  
San Francisco, USA, November 1997
- XIV Simposio Latino Americano de Física del Estado Sólido  
México, January 1998.
- Stochastic aspects of materials failure.  
Lyon, Francia, June 1998.
- XXth IUPAP International Conference on Statistical Physics.  
Paris, France. July 1998 (plenary session).
- Nonlinear Dynamical Systems and Acoustics.

- Barcelona, España. September 1998
- First Latin American Summer School on Materials Instabilities (**course lecturer**)  
Valparaíso, Chile. December 1998.
  - XI Simposio Chileno de Física.  
Santiago, Chile. December 1998.
  - International Symposium on Nonlinear Acoustics.  
Gottingen, Germany. September 1999.
  - Workshop of the Consortium of the Americas on Interdisciplinary Science on Sparsely Connected Systems: Porous and Granular Materials.  
San Carlos de Bariloche, Argentina. March 2000.
  - International Workshop "Frontiers in Materials Science"  
Viña del Mar, Chile. May 2002
  - Workshop "Modern Challenges in Statistical Mechanics: Patterns, Noise, and the Interplay of Nonlinearity and Complexity. Pan-American Advanced Studies Institute (PASI).  
San Carlos de Bariloche, Argentina. June 2002. (**Course Lecturer**)
  - European Research 2002  
Bruselas, Bélgica, November 2002
  - International Workshop "Frontiers in Materials Research"  
Viña del Mar, Chile. April 2004
  - XVI Simposio Chileno de Física.  
Viña del Mar, Chile. November 2008.
  - Powders and Grains 2009  
Colorado School of Mines, Golden, Colorado, USA, July 13-17, 2009.
  - Workshop on "Matière: Structure et Dynamique"  
July 2017, ENS-Lyon, France.
  - Workshop on Science  
Santiago, Chile 2019.
  - Workshop on Nonequilibrium Structures  
Valparaíso, Chile, November 2019
  - Workshop on Science  
Santiago, Chile 2020.

- **Main Research Projects:**

- "Center for Advanced Interdisciplinary Research in Materials", FONDAP, CONICYT, 1999-2009. (Principal researcher: Director of Area).
- "*Intermittent dynamics of gas rising up in non-newtonian fluids*", CNRS-CONICYT, March 2006-January 2007; "*Estructuras elásticas delgadas*", ECOS-CONICYT, N°C03E04, January 2004-January 2007, (Director of Project)
- "*Dynamics of granular materials: from microscopic scale to collective effects at macroscopic scales*" Project CONICYT-ANR (France), N°ANR-011, 2010-2012, (Director).
- ANILLO-CONICYT, ACT 95, "Nano y Micromecánica de Sistemas Frágiles", 2010-2012, (Sub-Director).
- FONDECYT, N°1100603, "*Surface growth of CaCO<sub>3</sub> in the presence of Dermatan Sulfated Molecules: Study of morphology and mechanical properties of {104} facet by atomic force microscopy*" 2010-2012, (Director).

- CNRS-CONICYT, “GRANular-piles Stability and Perturbations: GRAPS”, 2012-2013, (Director).
- FONDECYT, N°1130922, “Modified AFM tips interacting with supported lipid bilayers: a thermal noise approach”, 2013-2015 (Director).
- FONDEQUIP, N°EQM130149, “Espectroscopia Confocal Raman asistida por Microscopia de Fuerza Atómica: Superficie Nano y Micro estructuradas”, 2013-2015, (Director).
- NICOP RESEARCH GRANT, N°N62909-13-1-N268, “A Nonlinear Energy Harvesting (NEH) device to convert broad band motion into electrical power”, 2013-2015, (Director).
- “Noise spectroscopy of micro cantilevers: applications to protein dynamics detection”, FONDECYT-Chile Grant: 1161010, 2016-2020. (Director).
- “Mechanical Response of Single pili During Bacterial Adhesion”, FONDECYT-Chile Grant: 1201013, 2020-2024. (Director).
- European Commission, Horizon (2020-2023) Project for the storage of CO<sub>2</sub> and the mitigation of effects of global warming. 2020-2023, Main researcher (Director: Alain Zanella, France).
- LIA-MSD France-Chile Laboratoire International Associé CNRS, Matière: Structure et Dynamique, deputy director, (director: J.-Ch. Géminard, Ens-lyon, France) 2017-2021.

- **Main Educational Projects:**

These projects played a mayor role at improving quality of graduate and undergraduate programs in science and engineering at the University of Santiago.

- MECESUP, N°USA9903 (Graduate), Director; Full upgrade of PhD programs of Universidad de Santiago, Physics, Chemistry and Material Engineer.
- MECESUP, N°USA0003 (Undergraduate), Co-Director; “Materiales y Aplicaciones de la Optica”, PBCT: “Fortalecimiento de la Base Científica de Chile”, N°PSD-54, 2008-2013, Director.
- Project for teaching innovation (PID. Usach) New approach for the analysis of physics phenomena and teaching (2019).
- “Science for Citezenship” national course for practicing teachers to implement the new curricular national bases for teaching science in Chile, MINEDUC\_2019. Centro de Perfeccionamiento, Experimentación e Investigaciones Pedagógicas, CPEIP2020-MINEDUC.

- **Technical Assistance Projects** with industry and academic partners:

- Nonlinear response of rocks, N°DFI-3821, Director (2000-2010)
- Granular flows in underground mining (IM2-Codelco-Chile: 2010-2012)
- Rheological properties of food (2019-present)
- Optimizing packaging design (2020-present)
- Designing anti-bacterial substrate: bacterial adhesion and elasticity using AFM (2018-present)

- **Advising:**

-Advised about 20 Physical Engineer’s thesis: several of these engineers work presently at industries related to mining and research and development, some others have developed their own business, whereas the rest has pursued advanced studies in material engineering.

-Advised 4 Master thesis. These fellows become professors in France, USA and Chile.

-Advised 6 graduation thesis for Science Teachers. These fellows are science teachers at several high school in Santiago.

-Former PhD students: presently working in France, USA and Chile, in academic as well as in industry:

Dr. R. Bernal Associate professor Usach; Dr. F. Vivanco Assistant professor Usach; Dr. V. Apablaza (MatGeo Spa), Dr. F. Tapia, Postdoctoral fellow, Japan; Dr. Francisco Santibáñez Research associate U. North Carolina USA, Dr. C. Sanchez, Postdoctoral fellow, Japan; Dr. H. Alarcon Postdoctoral fellow UO'Higgins-Chile, Dr. J. Contreras Postdoctoral fellow, Paris; Dr. A. Rescaglio teaching assistant, Usach, USerena; Dr. N. Sepulveda Assistant professor UCentral, Chile, Dra. R. Muñoz Assistant professor Usach-Chile, Dr. David Espíndola, Assistant professor UO'Higgins-Chile.

-Former postdoctoral fellows:

Dr. V. Vidal, Chargé de Recherche I, CNRS-France. ENS-Lyon; Dr. B. Roman, Directeur de Recherche, CNRS-France. ESPCI-Paris; Dr. S. Chaieb, Associate Professor at University Urbana Champaign. USA; Dr. J. Pavez, Associate Professor, USACH; Dr. S. Job, Professor, SUPMECA, Paris, Francia; Dr. E. Hamm, Assistant Professor, USACH; Dr. Ch. Tassius, High School Teacher, Paris, France; Dr. S. Griffiths, Assistant Professor, Paris-France; Dr. Guillaume Lagubeau, Assistant Professor, Usach; Dr. Belfor Galaz, Assistant Professor USACH; Dr. Franco Tapia, postdoctoral fellow Japan; Dra. Nazek Maalouli, France; Dr. Felipe Aguilar, Assistant professor UAysen-Chile; Dr. Javier Contreras, postdoctoral fellow, Paris-France; Hervé Elettro (EPFL-Lausanne), Baptiste Darbois-Textier (CNRS-Paris-Francia).

- **Teaching:**

During my carrier I have taught many regular courses and specials topics at the undergraduate and the graduate levels.

-Graduate courses: Electrodynamics, Classical Mechanics, Physics of Surfaces, Statistical Mechanics, Physics of Materials, Continuous Media, Physics of Granular Materials, Topics on Single Molecules Assays, Modern Spectroscopy, Non-Linear Physics, Solid State physics, Scanning Probe Techniques, Acoustic Metamaterials, Surface Physics and Polymer Physics.

-Undergraduate courses: Statistical Mechanics, Classical Mechanics, Electromagnetism, Solid State Physics, Advanced Experimental Techniques, Modern Spectroscopy, Surface Physics, Nonlinear Phenomena and Principles of Optics, Integrated Natural Science.

- **Selected Publications Previous 2010**

**F. Melo**, J.F. Joanny and S. Fauve, *"Fingering Instability of Spinning Drops"*. Phys. Rev. Lett. **63**, 1958, 1989.

**F.Melo** and P.Oswald, *"Destabilization of a Faceted SmecticA-SmecticB Interface"*. Phys. Rev. Lett. **64**, 1381, 1990.

**F.Melo** and S. Douady, *"From Solitary Waves to Static Patterns via Spatiotemporal Intermittency"*. Phys. Rev. Lett. **71**, 3283, 1993.

**F. Melo**, P. Umbanhowar and H.L. Swinney, *"Transition to Parametric Wave Patterns in a Vertically Oscillated Granular Layer"*. Phys. Rev. Lett. **72**, 172, 1994.

**F. Melo**, P. Umbanhowar and H.L. Swinney, *"Hexagons, Kinks and Disorder in Oscillated Granular Layers"*. Phys. Rev. Lett. **75**, 3838, 1995.

P. Umbanhowar, **F. Melo** and H.L. Swinney, *"Localized excitations in a vertically vibrated granular layer"*. Nature **382**, 793, 1996.

E. Cerda, **F. Melo** and S. Rica, *"Model for Subharmonic Waves in Granular Materials"*. Phys. Rev. Lett. **79**, 4570, 1997.

S. Chaieb, **F. Melo** and J-Ch. Géminard, *"Experimental Study of Developable Cones"*. Phys. Rev. Lett. **80**, 2354, 1998.

- N. Mujica and **F. Melo**, "Solid-Liquid Transition and Hydrodynamic Surface Waves in Vibrated Granular Layers". Phys. Rev. Lett. **80**, 5121, 1998.
- E. Cerda, S. Chaieb, **F. Melo** and L. Mahadevan, "Conical dislocations in crumpling". Nature **401**, 46, 1999.
- F. Vivanco, **F. Melo**, C. Coste and F. Lund, "Surface wave scattering by a vertical vortex and the symmetry of the Aharonov-Bohm wave function". Phys. Rev. Lett. **83**, 1966, 1999.
- F. Vivanco and **F. Melo**, "Surface Spirals Waves in a Filamentary Vortex". Phys. Rev. Lett. **85**, 2116-2119, 2000.
- R. Bernal, C. Coste, F. Lund and **F. Melo**, "Normal-Mode-Vortex Interactions". Phys. Rev. Lett. **89**, 034501, 2002.
- L. Caballero and **F. Melo**, "Droplets of fine powders running uphill by vertical vibration". Phys. Rev. Lett. **93**, 258001, 2004.
- J.-Ch. Géminard, R. Bernal and **F. Melo**, "Wrinkles formations in axi-symmetrically stretched membranes". European Physical Journal E **15** (2), 117-126, 2004.
- S. Job, **F. Melo**, A. Sokolow and S. Sen, "How Hertzian solitary waves interact with boundaries in a 1D granular medium". Phys. Rev. Lett. **94**, 178002, 2005.
- E. Hamm and **F. Melo**, "Laser speckle correlation applied to flow field measurements". Europhys. Lett., **73** (3), 356-362, 2006.
- R. Bernal, Ch. Tassius, J.C. Géminard and **F. Melo**, "Mechanical characterization of elastic membranes: cell mechanics applications". Applied Phys. Lett. **90**, 063903, 2007.
- R. Bernal, P. Pullarkat and **F. Melo**, "Mechanical Properties of Axons". Phys. Rev. Lett., **99**, 018301, 2007.

- **Publications since 2010**

- S. Griffiths, A. Rescaglio, **F. Melo**, "Ultrasound propagation in wet and airless non-consolidated granular materials", Ultrasonics **50**, 139-144, 2010.
- R. Bernal, **F. Melo** and P. Pullarkat, "Drag force as a tool to test the active mechanical response of PC12 neurites", BioPhysical Journal, **98**, N. 3, 2010.
- V. Vidal, M. Ripepe, T. Divoux, D. Legrand, J.C. Geminard, **F. Melo**, "Dynamics of soap bubble bursting and its implications to volcano acoustics", Geophysical Research Letters, **37**, L07302, 2010.
- A.R. Guerrero, L. Caballero, A. Adeva, **F. Melo** and M.J. Kogan, "Exploring the Surface Charge on Peptide-Gold Nanoparticle Conjugates by Force Spectroscopy". Langmuir, **26**, (14), 12026-12032, 2010.
- H. Alarcón, O. Ramos, L. Vanel, F. Vittoz, **F. Melo** and J.C. Geminard, "Softening Induced Instability of a Stretched Cohesive Granular Layer". Phys. Rev. Lett. **105**, 208001-(4), 2010.
- F. Vivanco, T. Watt, **F. Melo**, "The 3D shape of the loosening zone above multiplied raw points in block caving through plasticity model with a dilation front". International Journal of Rock Mechanics & Mining Sciences **48**, 406-411, 2011.
- R. Bernal, Ch. Tassius, **F. Melo** and J.C. Geminard, "Elastic response and wrinkling onset of curved elastic membranes subjected to indentation test". European Physical Journal E, Vol. **34**, N.2, 13, 2011.
- F. Santibañez, R. Muñoz, A. Caussarieu, S. Job and **F. Melo**, "Experimental evidence of solitary wave interaction in Hertzian chains". Phys. Rev. E **84**, 026604, 2011.

Alberto Cornejo, José Jiménez, Leonardo Caballero, **Francisco Melo** and Ricardo B. Maccioni, "*Fulvic Acid inhibits aggregation and promotes disassembly of tau fibrils associated with Alzheimer's disease*". *Journal of Alzheimer's Disease* **27**, 143-153, 2011.

E.Gonzalez, J.Pavez, I.Azocar, J.H.Zagal, X.Zhou, **F.Melo**, G.E.Thompson and M.A.Páez, "*A silanol-based nanocomposite coating for protection of AA-2024 aluminium alloy*", *Electrochimica Acta* **56**, 7586-7595, 2011.

E. Hamm, F. Tapia, **F. Melo**, "*Dynamics of shear bands in a dense granular material forced by a slowly moving rigid body*". *Phys. Rev.* **E84**, 041304, 2011

Jean-Christophe Géminard, Lorene Champougny, Pierre Lidon, and **Francisco Melo**, "*Flexural fracturing of a cohesive granular layer*", *Phys. Rev.* **E85**, 012301, 2012.

\*R.Gonzalez, L.Caballero, J.Pavez, **F.Melo**, "*Adhesion, Stretching and Electrical Charges Assessment of Dermatan Sulfated Molecules by Colloidal Probes*", *Langmuir* **28**, 9506-9514, 2012.

H.Alarcón, J.C.Geminard and **F.Melo**, "*The effect of cohesion and shear modulus on the stability of a stretched granular layer*", *Phys.Rev.E* **86**, 061303, 2012.

F.Vivanco, S.Rica and **F.Melo**, "*Dynamical arching in a two dimensional granular flow*", *Granular Matter* **14**, 563-576, 2012.

D.Espíndola, B.Galaz and **F.Melo**, "*Ultrasound induces aging in granular materials*", *Phys. Rev. Lett.* **109**, 158301, 2012.

A.Riveros, K.Dadlani, E.Salas, L.Caballero, **F.Melo**, and M.Kogan, "*Gold nanoparticle-membrane interactions: implications in biomedicine*", *Journal of Biomaterials and Tissue Engineering* **3**, 1, 4-21, (February 2013).

S.Baeza, N.Vejar, M.Gulppi, M.Azocar, **F.Melo**, A.Monsalve, J.Pérez-Donoso, C.C.Vásquez, J.Pavez, J.H.Zagal, X.Zhou, G.E.Thompson, M.A.Páez, "*New evidence on the role of catalase in Escherichia coli-mediated biocorrosion*", *Corrosion Science* **67**, 32-41, 2013.

F.Vivanco and **F.Melo**, "*The effect of rock decompaction on the interaction of movement zones in underground mining*", *International Journal of Rock Mechanics and Mining Science* **60**, 381-388. 2013.

F.Tapia, D.Espíndola, E.Hamm and **F. Melo**, "*Effect of packing fraction on a shear band formation in a granular material forced by a penetrometer*". *Phys.Rev.E.*, **87**(1), 014201, 2013.

A. Takei, B. Roman, J. Bico, E Hamm, **F. Melo**, "*Forbidden Directions for the Fracture of Thin Anisotropic Sheets: An Analogy with the Wulff Plot*", *Phys. Rev. Lett.*, **110** (14), 144301, 2013.

J. C. Pastenes, J.C. Géminard, **F. Melo**, "*Oscillating gas flow induces reptation of granular droplets*", *Phys. Rev. E* **88**, 012201, 2013.

J. Briones, P. Toro, A. Encinas, L. Caballero, J. C. Denardin, **F. Melo**, E. Cerda, S. Robert, D. Lacour, and F. Montaigne, "*Large area patterned magnetic films by depositing cobalt layers on nano-wrinkled polydimethylsiloxane templates*", *Applied Physics Letters* **103**, 072404, 2013.

P.Díaz-Calderón, L.Caballero, **F.Melo**, J.Enrione, "*Molecular configuration of gelatin-water suspensions at low concentration*", *Food Hydrocolloids* **39**, 171-179, 2014.

J.C. Pastenes, J.C. Géminard, **F.Melo**, "*Interstitial gas effect on vibrated granular columns*", *Phys. Rev. E* **89**, 062205, 2014.



G.Lagubeau, A.Rescaglio, **F.Melo**, “Armoring a droplet: Soft jamming of a dense granular interface”, *Phys. Rev. E* **90**, 030201-1 – 030201-6, 2014.

J.Marthelot, B.Roman, J.Bico, J.Teisseire, D.Dalmas, **F.Melo**, “Self-Replicating Cracks: A Collaborative Fracture Mode in Thin Films”, *Phys. Rev. Lett.* **113**, 085502, 2014.

C.Sánchez, B.Alvarez, **F.Melo**, V.Vidal, “Experimental modeling of infrasound emission from slug bursting on volcanoes”, *Geophys. Res. Lett.* **41**, 1-7, 2014.

N. Sepúlveda, **F.Melo**, F.Vivanco, “Effects of grain shape on the response of a 2D granular material under constant shear rate”, *Phys. Rev. E* **90**, 052202, 2014.

L. Caballero, J.Mena, A.Morales-Alvarez, M.Kogan, **F.Melo**, “Assessment of the nature interactions of beta amyloid protein by a nanoprobe method”, *Langmuir*, 31 (1), pp 299–306, 2015

J. Marthelot, J. Bico, **F. Melo**, B. Roman, “A new failure mechanism in thin film by collaborative fracture and delamination: Interacting duos of cracks, *Journal of the Mechanics and Physics of Solids*”. 84, 214-229, (2015). [doi:10.1016/j.jmps.2015.07.010](https://doi.org/10.1016/j.jmps.2015.07.010)

R. Muñoz, F. Aguilar, C A M Wilson and **F. Melo**, “Pulling on super paramagnetic beads with micro cantilevers: single molecule mechanical assay application”, *Phys. Biol.* **12** 046011, 2015.

C. Sanchez, V.Vidal and **F. Melo**, Acoustic investigation of the aperture dynamics of an elastic membrane closing an overpressurized cylindrical cavity, *The European Physical Journal – Plus*, 130 (8), 1-12 (2015).

F. A. Sandoval, M. Sepúlveda, L. Bellon, **F. Melo**, High Resolution Viscosity Measurement by Thermal Noise Detection, *Sensors* 15 (11), 27905-27916 (2015).

F. Santibañez, R. Zuñiga, **F. Melo**, Mechanical impulse propagation in a three-dimensional packing of spheres confined at constant pressure, *Physical Review E*. 93 (1), 012908, (2016).

A. Ibarra, B. Roman and **F. Melo** Tearing path in a thin anisotropic sheet from two pulling points: Wulff’s view, *Soft Matter* (2016) Doi:10.1039/C6SM00734A.

F. Vivanco, JM. Mercado, F. Santibañez and **F. Melo**, The stress profile in a 2D silo: effects induced by friction mobilization. *Physical Review E* 94 (2), 022906, (2016).

D. Espíndola, B. Galaz and **F. Melo**. Creep of sound paths in consolidated granular material detected through the coda wave interferometry, *Physical Review E* 94 (1), 012901 (2016).

Stefan Leo Philipp Wolf, Leonardo Caballero, Francisco **Melo**, Helmut Cölfen, “Gel-Like Calcium Carbonate Precursors Observed by in situ AFM”, *Langmuir*, 33 (1), pp 158–163 **doi:** 10.1021/acs.langmuir.6b03974, (2017).

Baptiste Darbois Texier, Alejandro Ibarra, and Francisco **Melo**, Helical locomotion in a granular media, *Phys. Rev. Lett.* 119, 068003, (2017).

Baptiste Darbois Texier, Alejandro Ibarra, and Francisco **Melo**, “Low-resistive vibratory penetration in granular media” *PloS one* 12 (4), (2017).

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