

# FRANCK J. VERNEREY

## PERSONAL DATA

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## PROFESSIONAL EXPERIENCE & RESEARCH INTERESTS

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**Associate Professor**, University of Colorado, Boulder, CO  
Mechanical Engineering, August 2014-present  
Affiliate faculty in Material Science and Engineering, Civil Engineering and Applied Mathematics

**Assistant Professor**, University of Colorado, Boulder, CO  
Civil, Environmental, and Architectural Engineering, August 2007- July 2014  
Fellow in Material Science and Engineering and Affiliate faculty in applied Mathematics

**Postdoctoral researcher, Northwestern University, Evanston, IL**  
Program of Theoretical and Applied Mechanics, June 2006 – June 2007  
Advisor: B. Moran

### Research expertise and interests: Mechanics of Soft Matter

- **Statistical Mechanics of dynamic networks.** Such networks include supramolecular polymers and hydrogels, a majority of bio-polymers as well as insect swarm aggregates (fire ants and honey bees). We use statistical mechanics to understand the link between microscopic physics and the emerging mechanical behavior of the network, such as its elastorheology, adaptation to loads, damage and self-healing.
- **Micromechanics of biological growth.** We use analytical and computational method to understand the fundamental mechanisms of growth in animal and plant tissues. More specifically, we investigate (a) the in-vitro growth of cartilage from cell-laden hydrogel for personalized tissue engineering and (b) the growth and morphogenesis of fungal cells for crop engineering and as a bio-inspiration for functional materials.
- **Bio-inspired active matter and soft machines.** We use theoretical mechanics to identify key concepts responsible for functionality and intelligence in biological materials and aim to mimic these mechanisms in simpler synthetic systems. We have explored (a) the mechanics of fish skin as an inspiration for soft armors and (b) the mechanics of maggot locomotion as an inspiration for active particles that can self-propel in confined spaces.

Related scientific publications can be found at the end of the CV

## EDUCATION AND TRAINING

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### Ph.D., Theoretical and Applied Mechanics

Northwestern University, Evanston, IL, June 2002 – June 2006

- Thesis research: “Multi-scale Continuum Theory for Microstructured Materials”
- Reading Committee: B. Moran (chair), W.K. Liu and G.B. Olson

### M.S., Theoretical and Applied Mechanics

Northwestern University, Evanston, IL, August 2000 – June 2002

- Thesis research: “Assessment of Interface Debonding via Arc Length Method and Lagrange Multipliers”
- Reading Committee: B. Moran (advisor), W. K. Liu (co-advisor)

### B.S., M.S. and diplome d’ingenieur, Civil Engineering

Ecole Speciale des Travaux Publics (ESTP), Paris, France, August 1998 – June 2000

### Preparatory School for Scientific “Grandes Ecoles”

Lyce Victor Hugo, Besancon, France

First two years of undergraduate education, August 1996 – June 1998

## HONORS AND AWARDS

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- **2018:** Outstanding Researcher Award, Mechanical Engineering, CU-Boulder
- **2017: PECASE:** Presidential Early Career Awards for Scientists and Engineers (Highest U.S. government honor awarded to the 100 most promising U.S. scientists and researchers in all fields of science)
- **2017:** Outstanding Graduate Educator Award, Mechanical Engineering, CU-Boulder
- **2014: CAREER:** National Science Foundation career award
- **2013:** Dean’s Faculty fellowship, College of Applied Science and Engineering, CU-Boulder
- **2013:** Young Researcher Award, Civil, Environmental and Architectural Engineering, CU-Boulder
- **2008:** Junior Faculty Development Award, CU-Boulder
- **2001-2006:** Office of Naval Research Grant for research assistantship

## FUNDED RESEARCH PROJECTS

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- **National Science Foundation, Mechanics of Materials program,** Kinetic theory of Dynamic Polymers: From molecular mechanisms to elasto-rheology, (09/01/18 - 08/31/21) Award Amount: **\$400,000**. Role: Principal investigator.

- **National Science Foundation, Biomechanics and Mechanobiology program**, Tenocyte Mechanobiology in a Fiber Composite Mimetic (09/01/18 - 08/31/21), Award Amount: **\$499,979**. Role: Co-Principal investigator, with Stephanie Bryant (PI).
- **3M Corporation**, Eulerian Approach to Model Extreme Deformations in Visco-elastic Adhesives (03/01/18 - 02/28/20). Award Amount: **\$225,000**. Role: Principal investigator
- **National Science Foundation, Div. Materials Research**, Ultrathin Deformable Materials and Protective Coatings Bio-inspired by Scaled Skins, Biomaterials Program (07/15/14 - 07/14/17). Award Amount: **\$420,000**. Role: Principal investigator, with Mark Stoykovich, CU Boulder
- **National Science Foundation, CAREER**, In-Silico Tissue Engineering: An Active-Learning Computational Methodology to Guide the Design of Tissue Scaffolds, (02/01/14 - 12/31/19), Award Amount: **\$400,000**, Role: Principal investigator
- **National Institute of Health**, Personalizing Matrix Assisted Autologous Chondrocyte Implantation, R01 AR065441-01, (09-12-13 – 08-31-18), Award Amount: **\$1,460,286**, Role: Co-principal investigator, with Stephanie Bryant (CU Boulder)
- **Membrane Science, Engineering and Technology center**, Interaction between soft particles and membranes, (01/01/14 - 05/31/18), Award Amount: **\$150,000**. Role: Principal Investigator, with John Pellegrino (CU Boulder)
- **National Institute of Health**, Engineering Bimodal Degrading Hydrogels, (04-01-11 – 03-31-13), Award Amount: **\$353,331**. Role: Multiple Principal investigator, with Stephanie Bryant (CU Boulder).
- **Seed Grant, CRCW, University of Colorado**, An innovative look at fibroblast evolution through multi-physics modeling, (09-01-10 – 08-31-12), Award Amount: **\$43,750**, Role: Multiple Principal investigator
- **National Science Foundation, Nano and Bio Mechanics program**, Multiscale Biomimetic Study of the Mechanics of Fish Scales, (02-01-10 – 01-31-13), Award Amount: **\$228,131**. Role: Principal Investigator, with Francois Barthelat (McGill University)
- **National Science Foundation, Structural Materials and Mechanics**, Experimental Study and Theoretical Modeling of High Performance Recycled Aggregate Concrete. (05-01-09 – 05-31-12), Award Amount: **\$249,998**. Role: Principal investigator, with Yunping Xi (CU Boulder)
- **CRCW, University of Colorado, Young Faculty Award**, Biomimetics Study of Fish Scale Structures (07-01-08 – 06-03-09), Award Amount: **\$5,000**. Role: Principal investigator

## VISITING POSITIONS & INVITED TALKS

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- **Visiting Researcher, Ecole Polytechnique, France**  
Solid Mechanics Laboratory (LMS), May-June 2018

- **Visiting Professor, Ecole Nationale Supérieure de Mécanique et des Microtechniques, France**  
FEMTO ST Laboratory, January 2018
- **Visiting Professor, Università degli Studi di Parma, Italy**  
Department of Structural Engineering, Summer 2017
- **Visiting Professor, Université de Reims - Champagne-Ardenne, France**  
Medical School, March 2016

**Invited Presentations, Talks, Colloquia** (Selected from the past 18 months)

13. **Mechanics of Active Solids or How Intelligence Emerges from Dynamic Networks**, Syracuse University, NY, Oct 26, 2018
12. **Statistical mechanics of active networks: from individual to Collective behavior**, ECPCI, Paris, May 29, 2018
11. **Mechanics lessons from active insect aggregations**, Mechanical Engineering, University of Colorado at Colorado Springs, March 22, 2018
10. **Mechanics of Dynamic Networks: From Individual to Collective Behavior**, Solid Mechanics Laboratory (LMS), Ecole Polytechnique, France, December 21, 2017
9. **Mechanics of dynamic networks from polymers to fire-ants**, Physics Department, University of Colorado Boulder, November 26, 2017
8. **Extreme mechanics of soft matter: from soft colloids to dynamic polymers**, 3M Corporation, Minneapolis, November 8, 2017
7. **Statistical Mechanics of Dynamic Networks: From Individual to Collective Behavior**, School of Physics, Georgia Tech, October 3, 2017
6. **Keynote lecture: Soft Mechanics of Scaled Skins From protection to locomotion.**, Society of Engineering Science Meeting, Boston, MA July 27, 2017
5. **Keynote lecture: Tuning hydrogel mechanics for targeted tissue engineering**, Society of Engineering Science Meeting, Boston, MA, July 26, 2017
4. **Keynote lecture: Computational Modeling of Hydrogel-Based Tissue Engineering: En Route to Personalized Regenerative Medicine**, US National Congress of Computational Mechanics, Montreal, Canada, July 17, 2017
3. **Mechanics of Soft Matter: From Structure to Functionality**, Department of Engineering, University of Parma, Italy, May 30, 2017
2. **Programmable hydrogel scaffolds for in-situ tissue engineering: how to tune tissue growth with hydrogel degradation?**, Medical School, Université de Reims Champagne-Ardenne, Reims, France, January 28, 2016
1. **Computational Tissue Engineering Tuning Tissue Growth with Scaffold Degradation in Enzyme-Sensitive Hydrogels**, Penn Institute for Computational Science (PICS) and Applied Mathematics and Computational Science (AMCS) Colloquium Series, University of Pennsylvania, Philadelphia, USA, January 21, 2016

## TEACHING

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- Bio-Inspired Active Matter (MCEN 6228-002), Upper-level graduate class, University of Colorado, Spring 2018
- Mechanics of Soft Matter (MCEN4228/5228), Graduate level class, University of Colorado, Spring 2015, spring 2017, spring 2018, fall 2018.
- Mechanics of Solids (MCEN2063), Undergraduate class, University of Colorado, Fall 2018.
- Methods of Engineering Analysis (MCEN5020), Graduate level class, University of Colorado, fall 2016, 2017
- Introduction to Finite Elements (CVEN4511-5511 and MCEN 4173/5173), graduate level class, University of Colorado, Fall 2009, Fall 2011, Fall 2012, Fall 2014.
- Finite Element for Structural Analysis (CVEN6525), graduate level class, University of Colorado, Spring 2008.
- Advanced Mechanics of Materials I (CVEN5161), graduate level class, University of Colorado, Fall 2010.
- Advanced Mechanics of Materials II (CVEN6161), graduate level class, University of Colorado, Spring 2009.
- Mechanics of Materials I (CVEN3161), undergraduate class, University of Colorado, Fall 2010, Spring 2011, Fall 2013.
- Analytical Mechanics, Dynamics (CVEN3111), undergraduate class, University of Colorado, Spring 2012, Spring 2013.
- Analytical Mechanics, Statics (CVEN2121), undergraduate class, University of Colorado, Fall 2008, Spring 2010.

## ADVISOR FOR PH.D, M.S, UNDERGRADUATE AND INTERN STUDENTS

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### Ph.D. students

- Robert Wagner (Current): Mechanics of active matter aggregates: from fire-ant aggregations to active synthetic materials.
- Tong Chen (Current): Computational Mechanics of the elasto-rheology of polymers under extreme deformation.
- Shankar Lalitha Sridhar (Current): The role of dynamic networks in growth: from fungal growth to tissue engineering.
- Kanghyeon Koo (Current): Multiscale modeling of the soft particle transport in random porous media.

- Eduard Benet (Graduated fall 2018): Shell theory in soft matter: viscoelasticity, adhesion, and transport phenomena  
Reading committee: F. Vernerey, R. Long, F. Lopez-Jimenez, J. Pellegrino, JH. Song
- Umut Akalp (Graduated fall 2016): Multiscale modeling of matrix production and degradation in bio-degradable scaffolds.  
Reading committee: F. Vernerey, S. Bryant, A Doostan, R. Pak
- Louis Foucard (Graduated Summer 2014): Bio-physical modeling of the role of cell membrane on fibril formation and mechano-sensing.  
Reading committee: F. Vernerey, R. Pak, R. Regueiro, D. Bortz and A. Rajaram.
- Kamtornkiat Musiket (Graduated Fall 2014): Mechanical Properties of Concrete Structures under Different Loading Rates.  
Reading committee: F. Vernerey, Y.P. Xi, A Liel, W. Srubar.
- Mohammadreza Kabiri (Graduated Fall 2013): Adaptive Concurrent Multiscale Modeling of localization and fracture in heterogeneous media.  
Reading committee: F. Vernerey, R. Regueiro, Y. Xi, A. Doostan and M. Stoykovich
- Mehdi Farsad (Graduated Fall 2011): Chemo-Mechanical Approach to Model Cell Contraction and Spreading on Elastic Substrates  
Reading committee: F. Vernerey, R. Pak, R. Regueiro, Y. Xi, A. Rajaram and S. Bryant.

#### **M.S. students (with thesis)**

- Revathi Priyanka Mohan (Current) Research thesis: The role of dynamic networks on the growth of fungal cells: study of the phycomyces
- Jian Kan (M.S., Mechanical Engineering, 2018) Research thesis: Fabrication and Mechanics of Active Hydrogel Crawlers in porous Media
- Hongtian Zhu (M.S., Mechanical Engineering, 2018) Research thesis: Competition between Adhesion and Elastic instabilities during blister inflation.
- Zachary White (M.S., Mechanical Engineering, 2018) Research thesis: Mechanics of bio-inspired 3D printed fish-scale structures during ballistic impact.
- Nate Nargolis (M.S., Material Science and Engineering, 2017) Research thesis: Hygromorphic scales for use in water from morning dew and elementary model of hydrogel expansion properties.
- Marti Garriga Font (M.S., Civil, Environmental and Architectural Engineering, 2016) Research thesis: Micro-Crawlers in Confined Space: Volume Oscillating Hydrogels.
- Gaspard De Roucy (M.S., Civil, Environmental and Architectural Engineering, 2015): Computational study of the role of hydrolytic degradation in PEG-based cartilage engineering
- Natasha Funk (Graduated Spring 2014): Mechanics and design of synthetic fish-skin  
Reading committee: F. Vernerey, m. Stoykovich and V. Saouma
- Valentin Dhote (M.S., Civil, Environmental and Architectural Engineering, 2012): Enzyme mediated degradation and matrix production of chondrocytes in hydrogels.  
Reading committee: F. Vernerey, S. Bryant and R. Regueiro

- Jonathan Figueroa (M.S., Civil, Environmental and Architectural Engineering, 2012): Beam theory for modeling the light and gravity sensitive motion of plant stems.  
Reading committee: F. Vernerey, R. Pak and M. Stoykovich
- Gregg Flores (M.S., Civil, Environmental and Architectural Engineering, 2011): The use of optimization theory as an indirect way of determining of material properties.  
Reading committee: F. Vernerey, Y. Xi and R. Regueiro
- Spencer Hallowell (M.S., Civil, Environmental and Architectural Engineering, 2011): Damage and fracture of fiber-reinforced composites  
Reading committee: F. Vernerey, R. Regueiro and C. Fellippa
- Mohamed Abdelrahman (M.S., Civil, Environmental and Architectural Engineering, 2011): Multiscale adaptive Finite elements modeling of fracture in heterogeneous media.  
Reading committee: F. Vernerey, Y. Xi and R. Regueiro
- Eric Greenwald (M.S., Chemical and Biological Engineering, 2010): A theoretical investigation of cell mediated hydrogel degradation.  
Reading committee: F. Vernerey, S. Bryant and M. Stoykovich
- Ross Foster (M.S., Mechanical Engineering, 2009): Micro-Porosity of the Intervertebral Disc and Its Effects on Fluid Transport: A Scanning Electron Microscopy and Histological Study  
Reading committee: F. Vernerey and V. Fergusson.

### Undergraduate students

**Abhishek Das** (Academic year 2018-2019): Imaging and characterization of growing fungi, **Madison Davis** (Academic year 2018-2019): Fabrication of active solids inspired by insect aggregations, **Emily Volk** (Academic year 2017-2018): Biomimetic actuation of soft mag-bots, **Kelly Gazarik** (Academic year 2017-2018): Experimental study of phycomyces growth. **Millicent Gabriel** (Academic year 2016-2017): Exploration of the anisotropic friction properties of fish-scale structures, **Devin Sakamoto** (fall 2015): Monte-Carlo network model for the study of particle diffusion in crowded environments. **Eliot Kersgaard** (2014-2015): Mechanics of bio-inspired self-motile gel particles, **Aly Badran** (2014-2015): Computational modeling of porous networks, **Christina Jones** (NSF REU student 2012): Mechanics of fish-scale structures, **Ralph Kassouf** (NSF REU student 2011-2012): Mechanics of fish-scale structures, **Lauren Gardenshwarz** (Discovery and learning apprentice 2010-2011 and NSF REU student 2011-2012): Experimental and modeling studies of the active behavior of adherent cells, **Krista Donahue** (Discovery and learning apprentice 2009-2010): Experimental investigation of fibroblast evolution due to substratum stiffness and tonicity of external solution, **Yevgeniy Kaufmann** (Undergraduate Research Opportunities Program 2008-2009): Analysis of the multiscale structure of fish-skin.

### Student interns

**Guillaume Lostec** (summer 2017) from Ecole Normale Supérieure de Cachan, France, **Marie Dubus** (fall 2016): Université de Reims Champagne Ardenne (France) in the laboratory EA 4691 BIOS, France, **Raghuvver Lalitha Sridhar** (summer 2016): Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam, Tamil Nadu, India, **Xavier Espinet** (spring-summer 2012): Universitat Politècnica de Catalunya (Spain), **Eduard Benet** (spring-summer 2012): Universitat Politècnica de Catalunya (Spain), **Paul Hauseux** (spring-summer 2010): Ecole Normale Supérieure

de Cachan (France), **Thibaud Chevalier** (spring-summer 2008): Ecole Normale Supérieure de Cachan (France)

## PROFESSIONAL SERVICE ACTIVITIES

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- **Leadership**

Organizer of the first **Rocky Mountain Active Matter workshop**, August 10, 2018. Day long symposium that gathered research groups working on the topic of active matter in the Colorado region. The first edition featured presentations from 12 research groups from physics, chemistry, mechanics, robotics and material science from CU Boulder and UCCS.

- **Professional societies and technical committees:**

ASCE national technical committee on Modeling Inelasticity and Multiscale Behavior, ASME Tissue and Cellular Engineering committee, ASME national technical committee of Mechanics in Biology and Medicine, ASCE EMI (Engineering Mechanics Institute) technical committee Biomechanics, ASCE EMI (Engineering Mechanics Institute) technical committee on Computational Mechanics

- **Service to technical journal**

- **Associate editor** for Computer Modeling in Engineering and Science, Frontiers in materials, Mathematical Problems in Engineering
- **Guest editor** of the special issue in Polymers, MDPI (2018), Computational Modeling in Engineering and Science (2010), International Journal for Multiscale Computational Engineering (2008).
- **Peer reviewer for:** Advanced Materials, Journal of the Royal Society Interface, Soft Matter, Philosophical Transactions, Journal of the Mechanics and Physics of Solids, Nature Scientific Report, Macromolecules, Biomechanics and Modeling in Mechanobiology, Biophysical Journal, International Journal of Solids and Structures, International Journal of Numerical Methods in Engineering, Computer Methods in Applied Mechanics and Engineering, BionanoScience, Computational Mechanics, Engineering Fracture Mechanics, Journal of Engineering Mechanics, Computational Materials Science, Mechanics of Materials, Mechanics of Advanced Materials and Structures, Mechanics Research Communications, Archive of Applied Mechanics, International Journal of Multiscale Computational Engineering, Computational Modeling in Engineering and Science

- **Service to national agencies**

- Panel reviewer for the National Science Foundation, program of Biomechanics and Mechanobiology, program of Mechanics of Materials, program of Structural Materials and Mechanics, Program of Materials Engineering and Processing
- Panel reviewer for the Interagency Arctic Science, Engineering, and Education for Sustainability (ArcSEES)
- Panel reviewer for the NIH/NSF program on “ Predictive Multiscale Models for Biomedical, Biological, Behavioral, Environmental and Clinical Research (Interagency U01)



- **Service to Scholarly or Professional Organizations: symposia organization**

World Congress of Computational Mechanics, World Congress of Biomechanics, Society of Engineering Science, Pan-American Congress of Applied Mechanics, International Conference on Coupled Problems in Science and Engineering, USACM Thematic Conference on Multiscale Methods and Validation in Medicine and Biology, Engineering Mechanics Institute, National Congress of Computational Mechanics, European Conference on Computational Mechanics, U.S. National Congress of Theoretical and Applied Mechanics, ASME International mechanical engineering congress and exposition

## SCHOLARLY PUBLICATIONS

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**Peer Reviewed Research Papers** (The superscript \* denotes corresponding author)

76. Shen, T, Benet, E., Sridhar S.L, Abadie, J., Piat E. and **Vernerey, F.J.\*** (2019), Separating the contributions of zona pellucida and cytoplasm in the viscoelastic response of human oocytes, *Acta Biomaterialia*, <https://doi.org/10.1016/j.actbio.2018.12.034>.
75. **Vernerey, F.J.\***, Benet E., Blue L., Fajrial A.K., Sridhar S.L, Lum J., Shakya G., Song K.H., Thomas A.N. and Borden M.A. (2019) Biological Active Matter Aggregates: Inspiration for Smart Colloidal materials, *Advances in colloid and interface science* 263, 38-51
74. Sridhar, S.L., Ortega, J.K and **Vernerey, F.J.\*** (2018), A Statistical Model of Expansive Growth in Plant and Fungal Cells: The Case of *Phycomyces*, *Biophysical journal* 115 (12), 2428-2442
73. **Vernerey, F.J.\***, Shen, T., Sridhar, S.L. and Wagner, R. (2018), How do fire ants control the rheology of their aggregations? -A statistical mechanics approach, *Journal of the Royal Society, Interface*, 15, 20180642
72. **Vernerey, F.J.\***, Brighenti, R. Long, R. and Shen, T. (2018), Statistical Damage Mechanics of Polymer networks, *Macromolecules*, 51 (17), 66096622
71. Sridhar, S.L. and **Vernerey, F.J.\*** (2018), The distribution tensor: understanding anisotropy and rheology in dynamic polymers, *Polymers* 2018, 10, 848.
70. Shen, T. and **Vernerey, F.J.\*** (2018), Computational modeling of the large deformation and flow of viscoelastic polymers, *Computational Mechanics*, DOI: 10.1007/s00466-018-1619-0
69. White, Z. and **Vernerey, F.J.\*** (2018), Armours for soft bodies: How far can bioinspiration take us?, *Bioinspiration and Biomimetics*, 13(4), 041004.
68. Benet E., Lostec G., Pellegrino J. and **Vernerey, F.J.\*** (2018), Mechanical instability and percolation of deformable particles through porous networks, *Physical Review E*, 97, 042607.
67. Brighenti, A., Menzel, A and **Vernerey, F.J.** (2018), A physics-based micromechanical model for electroactive viscoelastic polymers, *Journal of Intelligent Material Systems and Structures*, <https://doi.org/10.1177/1045389X18781036>.

66. **Vernerey, F.J.\*** (2018), Transient Response of Nonlinear Polymer Networks: a Kinetic Theory, *Journal of the Mechanics and Physics of Solids*, 115, 230-247
65. Sridhar, S. and **Vernerey, F.J.\*** (2018), Localized Enzymatic Degradation of Polymers: Physics and Scaling Laws, *Physical Review Applied*, 9(3), 031001
64. Brighenti R., Artoni F., **Vernerey, F.J.**, Torelli, M., Domenichelli I., Dalcanale E. (2018), Mechanics of polymers cross-linked with switchable molecules, *Journal of the Mechanics and Physics of Solids*, 113, 65-81.
63. Shen, T.; Font, M, Jung, S.; Gabriel, M.; Stoykovich, M.; **Vernerey, F.J.\***; (2017), Remotely Triggered Locomotion of Hydrogel Mag-bots in Confined Spaces, *Nature Scientific Reports*, 7,16178
62. **Vernerey, F.J.\***, Shen, T. (2017), The mechanics of hydrogel crawlers in confined environment, *Journal of the Royal Society Interface*, 14 (132), 20170242
61. Schneider, M. Chu, S. Sridhar, S.; De Roucy, G.; **Vernerey, F.J.**; Bryant, S. (2017), Local heterogeneities improve matrix connectivity in degradable and photoclickable PEG hydrogels for applications in tissue engineering, *ACS Biomaterials Science and Engineering*, 3 (10), pp 24802492
60. Stefferson, M., Norris S., **Vernerey, F.J.**, Betterton, M.D, Hough, L.E. (2017), Effects of soft interactions and bound mobility on diffusion in crowded environments: a model of sticky and slippery obstacles, *Physical Biology*, 14(4)
59. Bryant, S. and **Vernerey, F.J.** (2017), Programmable hydrogels for cell encapsulation and neo-tissue growth to enable personalized tissue engineering, *Advanced Healthcare Materials*,7, (1).
58. **Vernerey, F.J.\***, Long, R. and Brighenti, R. (2017), A Statistically-Based Continuum Theory for Polymers with Transient Networks, *Journal of the Mechanics and Physics of Solids*, 107, pp 1-20
57. Shankar L.S., Schneider, M., Chu, S., DeRoucy G., Bryant, S. **Vernerey, F.J.\*** (2017) Heterogeneity is key to hydrogel-based cartilage tissue regeneration, *Soft Matter*, 13, pp 4841-4855
56. A. C. Sullivan, S. Lalitha Sridhar, A. Resman, D. J. Glugla, M. D. Alim, **F.J Vernerey**, R. R. McLeod (2017) Mechanical response of holographic photopolymers, *Proc. SPIE 10233, Holography: Advances and Modern Trends V*, 1023300; doi: 10.1117/12.2265878;
55. Brighenti, R., **Vernerey, F.J.**, and Artoni, F. (2017) Rate-dependent failure mechanism of Elastomers, *Journal of Mechanical Sciences*, 130, pp 448-457
54. Benet, E., Badran, A., Pellegrino, J, and **Vernerey, F.J.\*** (2017) The porous medias effect on the permeation of elastic (soft) particles, *Journal of Membrane Science*, 535, pp 10-19
53. Chu, S., Shankar, L.S., Akalp, U., Skaalure, S., **Vernerey, F.J.** and Bryant, S.J. (2017) Understanding the Spatiotemporal Degradation Behavior of Aggrecanase-Sensitive Poly(ethylene glycol) Hydrogels for use in Cartilage Tissue Engineering, *Tissue Engineering, Part A*, 23(15-16):795-810

52. Shen, T. and **Vernerey, F.J.\*** (2017), Phoretic Motion of Soft Vesicles and Droplets: An XFEM/Particle-based Numerical Solution, *Computational mechanics*, 60, Issue 1, pp 143161
51. Akalp, U; Schnatwinkel, C; Stoykovich, M., Bryant, S; and **Vernerey, F.J.\***(2017) Structural Modeling of Mechanosensitivity in Non-Muscle Cells: Multiscale approach to understand cell sensing, *ACS Biomaterials Science and Engineering*, 3 (11), pp 29342942
50. Benet, E. and **Vernerey, F.J.\*** (2016). Mechanics and stability of vesicles and droplets in confined spaces, *Physical Review E*, 94(6), 062613.
49. Brighenti R. and **Vernerey, F. J.\*** (2016) “A simple statistical approach to model the time-dependent response of polymers with reversible cross-links”, *Composites Part B: Engineering*, 115, pp 257-265
48. Akalp U., Bryant, S. and **Vernerey, F. J.\*** (2016) “Tuning Tissue Growth with Scaffold Degradation in Enzyme-Sensitive Hydrogels: a Mathematical Model”, *Soft Matter*, 2016,12, pp 7505-7520
47. **Vernerey, F. J.\*** and Akalp U. (2016) “Role of catch bonds in actomyosin mechanics and cell mechanosensitivity”, *Physical Review E*, 94, 012403.
46. Musiket, K, **Vernerey, F.J.** and Xi Y. (2017) “Numerical Modeling of Fracture Failure of Recycled Aggregate Concrete Beams under High Loading Rates”, *International Journal of Fracture*, 203 (1), pp 263-276.
45. Foucard, L. and **Vernerey, F. J.\*** (2016) “A Particle-based Moving Interface Method (PMIM) for modeling the large deformation of boundaries in soft matter systems.”, *International Journal for Numerical Methods in Engineering*, 107 (11), pp 923946.
44. Skaalure, S., Akalp, U., **Vernerey, F. J.** and Bryant, S. (2016) “Tuning Reaction and Diffusion Mediated Degradation of Enzyme-Sensitive Hydrogels”, *Advanced Healthcare Materials*. 5 (4), pp 432-438
43. **Vernerey, F. J.\*** (2016) “A Mixture Approach to Investigate Interstitial Growth in Engineering Scaffolds”, *Biomechanics and Modeling in Mechanobiology*. 15(2), pp 259-78.
42. Akalp, U., Chu, S., Skaalure, S., Bryant, S.J., Doostan, A. and **Vernerey, F. J.\*** (2015) “Determination of the Polymer-Solvent Interaction Parameter for PEG Hydrogels in Water: Application of a Self Learning Algorithm”, *Polymer.*, 66, pp. 135147
41. Funk, N., Vera, M., Szewciw, L., Barthelat, F., Stoykovich, M., and **Vernerey, F. J.\*** (2015) “Bio-inspired fabrication and characterization of a synthetic fish skin for soft materials protection”, *ACS Applied Materials and Interfaces*, 24, pp 3040

**Highlight in Science**, p1434, vol 347 issue 6229 (March 2015)

40. Foucard, L., Aryal, A., Duddu, R.\* and **Vernerey, F.J.\*** (2015) “A coupled Eulerian-Lagrangian extended finite element formulation for moving interface problems in hyperelastic media”, *Computer Methods in Applied Mechanics and Engineering*, 283, pp 280302
39. Foucard, L. and **Vernerey, F. J.\*** (2014) “An X-FEM based numerical-asymptotic expansion for simulating a Stokes flow near a sharp corner”, *Invited paper for the International Journal for Numerical Methods in Engineering*. DOI: 10.1002/nme.4746

38. Foucard, L. and **Vernerey, F. J.** \* (2014) “Particle-based Moving Interface Method for the study of the interaction between soft colloid particles and immersed fibrous network”, *Invited paper in Computer Modeling in Engineering and Science*, 98(1), 101-127
37. **Vernerey, F. J.** \* and Kabiri, M (2014) “Adaptive Concurrent Multiscale Model for Fracture and Crack Propagation in Heterogeneous Media”, *Computer Methods in Applied Mechanics and Engineering*, 276, pp. 566-588
36. **Vernerey, F. J.** \* and Barthelat, F. (2014) “Skin and scales of teleost fish: simple structure but high performance and multiple functions”, *Journal of the Mechanics and Physics of Solids*, 68, pp. 66-76
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