

Horacio D. Espinosa

James and Nancy Farley Professor of Manufacturing and Entrepreneurship



Professor Espinosa received his BS in Civil Engineering from Northeastern University, Argentina. Before beginning graduate studies, he designed structures and foundations of multistory buildings. In 1987 he received his MSc in Structural Engineering, from the Milan Polytechnic, and his MSc in Applied Mathematics in 1990 and PhD in Solid Mechanics in 1992, both from Brown University. He then started his academic career as Assistant Professor of Aeronautics and Astronautics, at Purdue University, where he was promoted to Associated Professor with tenure in 1998. Since 2000 he has been on the faculty of Mechanical Engineering at Northwestern University, has held the James and Nancy Farley Professorship since 2009, has served as Director of the Theoretical and Applied Mechanics program since 2007, served as Faculty Director of the Nano/Microfabrication core facility (NUFAB), from 2013-2016, and Director of the Institute for Cellular Engineering Technologies. Espinosa also holds courtesy appointments in the Departments of Biomedical Engineering and Civil and Environmental Engineering at Northwestern University.

Espinosa has made significant contributions in the areas of deformation and failure of materials, from mesoscale dynamic failure of ceramics and composites to the mechanisms responsible for the hardness and toughness of biomaterials to size scale effects in elasticity and plasticity of thin films and low dimensional materials. He also designed and created microsystems for *in situ* atomic characterization of materials that enabled direct comparison to atomistic models. He created robust nanoelectromechanical switches, capable of millions of cycles, and demonstrated their ability to perform electromechanical logical operations. More recently, he invented microfluidic devices for single and multicell manipulation (e.g., gene editing) and analysis. He has published over 350 technical papers in these topics. His work received broad attention in the media including United Press International, NSF Discoveries, Frost and Sullivan, Science Daily, EurekAlert, Small Times, PhysOrg, Nanotechwire, Bio-Medicine, NanoVIP, Nanowerk, Genetic Engineering and Biotechnology News, Medical News Today, Materials Today, Next Big Future, Beyond Breast Cancer, AZoNano, Spektrumdirekt, MEMSNet.

Espinosa received numerous awards and honors including election to the *National Academy of Engineering* in 2020, the 2019 *Prager* Medal from the Society of Engineering Science, the 2013 *Sia Nemat Nasser* Medal and the 2016 *Murray* Medal from the Society for Experimental Mechanics (SEM), the ASME 2015 *Thurston* lecture award, the *Hetenyi* award (2005 and 2022) and the *Lazan* award (2008), both from SEM. He received the NSF-Career, ONR-YIP, and the American Academy of Mechanics (AAM) and Society of Engineering Science (SES) Junior Medals. Espinosa is a foreign member of *Academia Europaea*, the *European Academy of Arts and Sciences*, the *Russian Academy of Engineering*, and Fellow of AAAS, AAM, ASME, and SEM. He held visiting positions at Harvard University (1998-1999) and was the Timoshenko visiting Professor at Stanford University in 2011. Espinosa was the President of the Society of Engineering Science, in 2012, and serves in two committees of the *National Academies*, the U.S. National Committee on Theoretical and Applied Mechanics (current chair) and the Panel on Materials Science and Engineering, which advises the Army Research Lab. He is also a member of the IUTAM General Assembly and a past member of the IUTAM Congress Committee.

As Director of the NU Theoretical and Applied Mechanics program, Espinosa fostered an interdisciplinary program with a focus on materials education and research. He mentored more than 80 graduate students, post-docs, and visiting scholars of whom 30 hold professor positions at major domestic and international research universities. In the classroom, Espinosa taught many mechanics courses including new courses with an impact in materials and nanoengineering education. He also co-organized international events to promote mechanics of materials education and research such as the NSF *Pan-American Advanced Studies Institute Program (PASI) on Nano and Biotechnology* in Bariloche, Argentina, Nov. 13-22, 2006, and the *US-South America Workshop on Mechanics and Advanced Materials Research and Education* in Rio de Janeiro, Brazil, August 2-6, 2004. Espinosa served as Editor-in-chief of the *Journal of Experimental Mechanics*, Associate Editor of the *Journal of Applied Mechanics*, and Principal Founding Editor of *MRS Communications*. Currently, he is a co-editor of the *Wiley Book Series in Micro and Nanotechnologies* and serves in the editorial board of several journals.

HORACIO DANTE ESPINOSA

GENERAL INFORMATION

Address:

(Office)

Northwestern University
Department of Mechanical Engineering
Evanston, IL 60208
Phone: (847) 467-5989
Fax: (847) 491-3915

(Home)

718 Hibbard Rd
Winnetka, IL 60093
Phone: (847) 441-9389
E-mail: espinosa@northwestern.edu
<https://espinosa.mech.northwestern.edu/>

Education:

Ph.D. Solid Mechanics, Brown University, 1992

“Micromechanics of the Dynamic Response of Ceramics and Ceramic Composites”

Advisors: Professors R.J. Clifton and M. Ortiz

M.Sc. Applied Mathematics, Brown University, 1990

M.Sc. Solid Mechanics, Brown University, 1989

M.Sc. Structural Engineering, Polytechnic of Milan, Italy, 1987, Advisor: Giulio Maier

Civil Engineering, *Magna Cum Laude*, six-year professional degree, Northeastern National University, Argentina, 1981

Academic Appointments:

2017- Professor of Civil and Environmental Engineering (by courtesy)

2016- Professor of Biomedical Engineering (by courtesy)

1015- Co-Director, Institute for Cellular Engineering Technologies (iCET), Northwestern University

2013- 2016 Faculty Director of Nano/Microfabrication core facility (NUFAB), Northwestern University

2011 Stephen Timoshenko Visiting Professor (sabbatical), Stanford University

2009- *James N. and Nancy J. Farley Professor in Manufacturing and Entrepreneurship*

2007- Director, Theoretical and Applied Mechanics Program, Northwestern University

2004- Professor, Mechanical Engineering, Northwestern University

2000-2004 Associate Professor, Mechanical Engineering, Northwestern University

1998-1999 Visiting Professor (sabbatical), Eng. and Appl. Sci., Harvard University

1997-1999 Associate Professor, Aeronautics and Astronautics, Purdue University

1992-1997 Assistant Professor, Aeronautics and Astronautics, Purdue University

Honors and Awards:

- **Drucker Medal**, American Society of Mechanical Engineers, 2022
- **Paul Roell Medal**, ZwickRoell Science Award, 2021
- **Member**, *US National Academy of Engineering*, 2020

- **Prager Medal**, *Society of Engineering Science*, 2019
- **Member**, *Academia Europaea*, 2019
- **Executive Committee**, Society for Experimental Mechanics, 2017-2018
- **Murray Medal**, *Society for Experimental Mechanics*, 2016
- **Thurston Lecture Award**, American Society of Mechanical Engineers, 2015
- **Fellow**, American Academy for the Advancement of Science (AAAS), 2013
- **Member**, National Academies Panel on Materials Science and Engineering to advise the Army Research Lab, 2013-2016
- **Sia Nemat-Nasser Medal**, *Society for Experimental Mechanics*, 2013
- **2012 President**, Society of Engineering Science
- **Foreign Member** of the *Russian Academy of Engineering* (elected), 2011
- **Foreign Member** of the *European Academy of Sciences and Arts* (elected), 2010
- **Member**, National Academies, U.S. National Committee of Theoretical and Applied Mechanics, 2010-present, 2022-2023 (committee chair)
- **Board of Directors Member**, Society of Engineering Science (elected), 2008-2013
- **Fellow**, Society for Experimental Mechanics, 2008.
- **Lazan Medal**, Society for Experimental Mechanics, 2008.
- **SES Junior Medal**, Society of Engineering Science, 2007
- **Hetyenyi Award**, Society for Experimental Mechanics, 2005, 2022.
- **Fellow**, American Society of Mechanical Engineers, 2004.
- **Junior Award**, American Academy of Mechanics, 2002.
- **Fellow**, American Academy of Mechanics, 2001.
- **ASME, Electronic and Photonic Packaging Division, Appreciation Award**, 2001.
- **ONR-Young Investigator Award**, 1997.
- **NSF-CAREER Award**, 1996.
- **ASME, Materials Division, Appreciation Award**, 1996.

Leadership:

Professor Espinosa is a strong advocate for the role of engineering in addressing major societal needs. He early on realized the potential of engineering systems that when combined with stem cell and gene editing discoveries could lead to unprecedented understanding of disease mechanisms and identification of novel therapeutics. With the sponsorship of the Vice-President for Research (VPR), he organized a series of Workshops on “Personalized Cell Engineering for Diagnostics and Therapeutics”. The effort resulted in an NSF Engineering Research Center (ERC) proposal for *Cellular Engineering for Reprogramming and Therapeutics (CERT)*, led by Espinosa, in partnership with faculty from Stanford University, MIT, and University of Puerto Rico Mayaguez. The team was among a handful of finalists and received a highly recommended score during the NSF site visit. As a result of the attracted interest, Northwestern University launched in March 2015 a new Institute on Cellular Engineering Technologies (iCET), with Professors Espinosa (Engineering) and John Kessler (Medicine) as co-founding directors. The institute brought together researchers and faculty from several schools including the Feinberg

School of Medicine, the Weinberg College of Arts and Sciences, the McCormick School of Engineering, and the Kellogg School of Management. The institute awarded seed projects that resulted in several multi-PI awards and created the opportunity for Northwestern University faculty members to have the know-how and infrastructure for advancing other NSF ERC proposals, with a couple reaching finalist stage. Currently, as Director of iCET, Professor Espinosa is actively contributing to the Chang-Zuckerberg BioHub proposal, a partnership between Northwestern University, the University of Chicago, the University of Illinois at Urbana-Champaign, the city of Chicago, and the State of Illinois.

As Director of the Theoretical and Applied Mechanics (TAM) Program at Northwestern University, Professor Espinosa was instrumental in creating a culture of inclusion and belonging among faculty, students, and staff. The TAM program at Northwestern University has a long tradition and is considered among the most prestigious mechanics programs in the world. It has 25 faculty members from five departments (ME, CEE, MSE, BME, AM) within the school of engineering leading to an interdisciplinary program with very strong faculty diversity. Over the years, its faculty received many recognitions and distinctions (2 Presidential Medals, 10 National Academy of Engineering members, 5 National Academy of Sciences members, 2 foreign members of the Russian Academy of Engineering, 4 European Academy of Sciences and Arts members, and one of the highest numbers of ASME-Timoshenko medalists within US mechanics programs).

Over the years, Professor Espinosa has championed the creation of shared facilities needed to address national research priorities, recruitment and retention of exceptional faculty, and creation of an innovation ecosystem for faculty and students. In 2005 he chaired a university-wide committee to study the development of a new core micro and nanofabrication clean room facility. Because of the committee recommendations and his leadership, Northwestern University invested \$30M in a new 10,000 square foot state-of-the-art clean room facility (NUFAB) with a large suite of instrumentation for micro and nanofabrication. Espinosa served as Faculty Director of this core facility between 2013 and 2015, hired several staff members, created micro/nanotechnology lab courses for undergraduates, and opened the facility to NU and NSF supported undergraduate research. The facility, which was instrumental in attracting new hires in micro/nano and biotechnology, serves universities and industries in the Chicago area. Moreover, Professor Espinosa, as NUFAB faculty director, served as co-PI of the awarded NSF National Nanotechnology Coordinated Infrastructure – ShyNE, which enlarged NUFAB’s user base to a national network.

Entrepreneurship:

Professor Espinosa was the founder of Infinitesimal LLC, a Northwestern University spin-off company. The company commercializes tools for *single cell access and analysis* using licensed IP from Northwestern University. It received millions of dollars of funding from SBIRs and STTRs phases I and II from NSF and NIH leading to creation and commercialization of biotools. As a company member, Espinosa was intimately involved with all strategic matters. He interacted with VCs, incubators, and consultants on matters of customer discovery, market analysis, and sales. Building on these experiences, Espinosa co-taught courses on engineering entrepreneurship at the NU’s Farley Center for Entrepreneurship and Innovation.

Contributions to diversity and service:

By studying and practicing civil engineering in Argentina, pursuing an MSc in Italy, a PhD in the USA, being in the faculty of Purdue and Northwestern Universities, and spending sabbatical leaves at Harvard, Stanford, UCSD and UCSB, Professor Espinosa gained a unique perspective on the value of life experiences and diversity of perspectives. As TAM Director and ME executive committee member, he contributed to the increase in the number of women and minority faculty members. As member of the committee “*Future Leaders in Mechanical and Aerospace Engineering*,” a nationwide initiative that celebrates diversity and innovation, he mentors and highlights contributions by graduate students and postdocs from groups that are underrepresented among Mechanical and Aerospace Engineering faculties. As a delegate of the General Assembly of the International Union of Theoretical and Applied Mechanics (IUTAM), which has delegates from 48 countries, he advocated for the creation of a committee to increase diversity in the IUTAM’s executive committee. Currently he serves in a newly created IUTAM Diversity Advocacy Group.

Professor Espinosa served in the board of directors of the Society of Engineering Science (SES) from 2008-2013 and as SES President in 2012. During his tenure, the board revised and approved new by-laws to reflect changes in the management of the society. He also promoted the organization of outstanding annual meetings, including the SES 50th Anniversary Conference at Brown University, and the recognition of faculty who distinguished themselves in engineering science. Espinosa also served in the executive committee of the Society for Experimental Mechanics, and as editor of the journal of Experimental Mechanics. He serves in two committees of the *National Academies*, the Panel on Materials Science and Engineering to advise the Army Research Lab, and the U.S. National Committee on Theoretical and Applied Mechanics (currently chair). Internationally, he served on IUTAM’s Congress Committee and currently serves in its General Assembly.

SCHOLARLY ACTIVITIES:

Graduate Students Advised (current affiliation)

Agrawal, R. PhD (Shell India), Arrieta, H.V. M.Sc. (Knorr-Bremse GmbH, Germany), Barthelat, F. PhD (Professor, University of Colorado Boulder), Bellur, R. PhD (Professor, Gokaraju Rangaraju IET), Bernal, R. PhD. (Professor, UT Dallas), Castiglioni, A. MSc, Dong, S. PhD (Intel Co.), Emore, G. M.Sc., Fisher, M. M.Sc. (CONAE Consultant, Argentina), Ke, C. PhD (Professor, Binghamton University SUNY), Kim, K.H. PhD (LG Co.), Lee, S. PhD (Philips Co.), Locascio, M. MSc (DMC Inc.), Loh, O. PhD, (Intel Co.), Lu, H.C. Ph.D. (Borg Warner Automotive Company), McFarland, G. MSc. (US Army ARDEC), Milan, M. MSc, Mori, L. PhD. (McKinsey & Company), Nathamgari, S.S.P. PhD (Intel Co.), Panico, M. MSc (Exxon Mobil), Pantano, M. PhD (Professor, University of Trento, Italy), Parpoil, V. MSc (Allohouston, France), Patanella, A. M.Sc. (Professor and Department Chair, U. Nacional de La Plata, Argentina), Pedivellano, A. MSc (PhD. student Caltech), Peng, B. PhD (Professor and Associate Dean, University of Electronics Science and Technology of China), Ramachandramoorthy, R. PhD (Max Planck Forschung Institut, Germany), Ramaswamy, R. PhD (Prof. Gokaraju Rangaraju Institute of Engineering and Technology), Soler-Crespo, R. Ph.D. (Enova International), Roenbeck, M. Ph.D. (Asst. Prof. US Merchant Marine Academy), Safi, A. Ph.D.

(Medtronic), Wang, R. M.Sc., Xu, Y. M.Sc. (President, Intelligent MEMS Design Inc.), Zaheri, A. PhD (American Express), Zavattieri, P.D. Ph.D. (Professor, Purdue University), Zhu, Y. Ph.D. (Professor, North Carolina State U.), Lin, Z., Mukherjee, P., Nguyen, H. (Brown University), Lin, Z. (Knowles), Zhang, X., Mukherjee, P. (Ilumina). *Current PhD students:* Alderete, N.A., Ali, M.M., Lin, Z., Pathak, N., Patino, C.

Postdoctoral Scholars/Visiting Scholars Advised (current affiliation)

Ammu, S. (Quad/Graphics), Asgari, M. (McGill University), Beese, A. (Professor, Penn State University), Benedetti, I. (Professor, University of Palermo, Italy), Berbenni, S. (CNRS, France), Chang, L. (Professor, Beihang University), Chon, M. (Postdoctoral Research Associate, MIT), Comi, C. (Professor, Polytechnic of Milan, Italy), Corigliano, A. (Professor, Polytechnic of Milan, Italy), Daly, M. (Professor, University of Illinois at Chicago), Dwivedi, S.K. (Research Prof., Georgia Tech), Filleter, T. (Professor, Univ. of Toronto), Gailly, B. (Atelier Industriel de l'Aeronautique de Cuers-Pierrefeu, France), Gao, W. (Professor, UT San Antonio), Giraldo, J.P. (PhD, Univ. of Wisconsin, Madison), Gregoire, D. (Professor, Pau University, France), Hosseinian, E. (PhD, Georgia Tech), Huang, C. (Professor, Nanyang Technological University), Hyde, B. (CACI International Inc.), Kang, W. (Professor, Arizona State University), Kuljanishvili, I. (Professor, Saint Louis University), Latourte, F. (EDF, France), McNaughton, R. (Office Research Development, Northwestern University), Medina, L. (Postdoctoral Fellow, Cambridge University, United Kingdom), Minary, M. (Professor, UT Dallas), Naghari, M. (Professor, Texas A&M), Oh, C.S. (Professor, Kumoh National Institute of Technology, South Korea), Prorok, B. (Professor, Auburn University), Pucha, R.V. (Research Prof., Georgia Tech), Pugno, N. (Professor, University of Trento, Italy), Rim, J. (Datadog), Restrepo, D. (Professor University of Texas, San Antonio), Russel, B. (Professor, Cambridge University, United Kingdom), Tang, H. (ExxonMobil), Tran, P. (Res. Prof. Univ. of Melbourne, Australia), Yang, R. (Professor, University of Nebraska-Lincoln), Yavari, F. (Stryker), Yuan, G. (Intel Co.), Wei, X. (Professor, Peking University), Wu, Z. (Schott Optovance), Wu, B., Hanxun Jin (PhD Brown University)

Selected External Professional Activities:

- National Academies committee (Vice-chair), U.S. National Committee on Theoretical and Applied Mechanics, 2011-present
- IUTAM, General Assembly, 2019-2022
- IUTAM, Congress Committee, 2013-2020
- National Academies committee, Army Research Panel on Materials Science and Engineering, 2013-2016
- Founding Principal Editor, *MRS Communications*, 2010-2015
- Editor-in-chief of the *Journal of Experimental Mechanics*, 2006-2010.
- Co-editor of the Wiley Book Series in Micro and Nano Technologies, 2009-present
- Associate Editor of the *Journal of Applied Mechanics*, 2003-2010.
- Associate Editor of the *Journal of Experimental Mechanics*, 2002-2006.
- Editor of *Mechanics* a publication of the American Academy of Mechanics, 1998- 2004, (<http://www.AAMech.org/>).

- Special Issue of Journal of the International Federation for Medical and Biological Engineering, “*Medical and Biological Engineering and Computing*,” edited by C-T. Lim, J. Han, J. Guck and H.D. Espinosa, October 2010.
- Special issue of *Experimental Mechanics In Honor of Rodney James Clifton on the Occasion of his 70th Birthday Anniversary*, edited by Kaliat T. Ramesh, Guruswami Ravichandran, H.D. Espinosa, Published – April 2009.
- Special issue of *Experimental Mechanics* dedicated to *Modeling & Experiments in Cell & Biomolecular Mechanics*, edited by Ashkan Vaziri, Gang Bao, H.D. Espinosa, published in February, 2009.
- Special issue of *Experimental Mechanics* dedicated to “*MEMS and Nanotechnology - Experimental and Computational Mechanics Aspects*,” edited by H.D. Espinosa, 2003.
- Special issue of *Mechanics of Materials* dedicated to “*Deformation, Fracture and Failure of Advanced Materials*” honoring Professor Sia Nemat-Nasser, edited by H.D. Espinosa and G. Subhash, 2002.
- Special issue of *Mechanics of Materials* dedicated to “*Failure Mechanisms in Brittle Materials*”, edited by H.D. Espinosa and R.J. Clifton, Vol. 29, 1998.
- “*Advances in Failure Mechanisms in Brittle Materials*,” edited by R.J. Clifton and H.D. Espinosa, ASME/AMD219-MD75 publication, November 1996.

Selected Participation in Committees

- Argonne National Lab – Center for Nanomaterials (CNM), Users’ executive committee, 2008-2011
- *Clean room committee*, Northwestern University, 2007-2014
- *Regional Advisory Committee*: The Microfabrication Laboratory of the University of Illinois at Chicago has established a Regional Advisory Board to discuss policy issues regarding microfabrication facilities in the Chicago area. Professor Espinosa joined this committee together with scientist from UIC, NU and ANL.
- *Committee of Visitors*: this committee of 12 scientists from university, industry and national labs was asked to review the Civil and Mechanical Systems (CMS) Division at the National Science Foundation. Proposal review process, award procedures, impact of supported research, involvement of CMS division in new NSF-wide initiatives were examined and a report with recommendations prepared and submitted to the NSF director.
- *Fracture and Fatigue*, Society of Experimental Mechanics (SEM)
- *Ceramic Materials*, American Society of Mechanical Engineers (ASME)
- *Fracture*, American Society of Mechanical Engineers (ASME)
- *Electronic and Photonic Packaging*, American Society of Mechanical Engineers (ASME)

Selected Workshop, Symposia, and Short Courses Organizer:

- Symposium co-organizer, *100 Years of International Collaboration in Mechanics: The legacy of Theodore von Karman*, US National Congress of Theoretical and Applied Mechanics, UT Austin, 2022.
- Symposium co-organizer, Micro and Nano Systems and Applications, 11th European Solid Mechanics Conference, Galway, Ireland, 2022.
- Symposium co-organizer, Micro and Nanoengineering and Applications, 10th European Solid Mechanics Conference, Bologna, Italy, 2018.
- Symposium Organizer, Mechanics of Nano and BioMaterials, International Conference on Fracture, Rhodes, Greece, June 18-23, 2017
- IEEE-Northwestern University – Workshop on Big Data, Northwestern University October, 2017
- Symposia Organizer, Micro and Nanotechnologies, International Conference of Experimental Mechanics, Rhodes, Greece, July 2016.
- Graduate Short Course on Mechanics of Nanomaterials, Politecnico di Milano, Italy, February 2016
- Symposium P: Nanogenerators and Piezotronics, Materials Research Society Spring Conference, 2015.
- Graduate Short Course on MEMS/NEMS, Politecnico di Milano, Italy, February 2014
- Mini-Symposium on “*Nano and Biomechanics*,” USNCTAM, Michigan State University, June, 2014.
- Workshop on “*Personalized Cell Engineering for Diagnostics and Therapeutics*,” sponsored by Vice-president for Research Office and Feinberg School of Medicine, Northwestern University, March 9, 2013.
- “Multiscale Mechanics of Hierarchical Materials,” MRS Fall meeting, Boston, Nov. 28-Dec. 2, 2011.
- IUTAM Symposium on Full-Field Measurements and Identification in Solid Mechanics, Ecole Normale Supérieure de Cachan, France, July 2011 (with Francois Hild).
- “Micro and Nano Devices with Applications to Biology and Nanoelectronics,” Course organizer and main instructor, August 7-August 11, 2006, 16 lectures and 9 lab sessions, NSF Summer Institute on Nano Mechanics and Materials, Northwestern University.
- *NSF supported Pan-American Advanced Studies Institute Program (PASI) on Nano and Biotechnology – Argentina*, Nov. 13-22, 2006, co-organizer with G. Paulino and G. Buscaglia, 22 lectures and 1 full day hands-on experiments at the Balseiro Institute.
- “Fracture and Fatigue and Micro and Nano Scales,” co-organized with Dieter Wolf, Argonne National Laboratory, USA, Leslie Banks-Sills, Tel Aviv University, Israel, and Roberto Ballarini, CWRU, USA; ICF11 in Turin, Italy on March 20-25, 2005.
- *NSF supported US-South America Workshop on Mechanics and Advanced Materials Research and Education*, co-organized with Glaucio Paulino, Rio de Janeiro, Brazil, August 2-6, 2004.
- “Nanotechnology and MEMS- Experiments and Modeling,” co-organized with H. Van Swygenhoven of Paul Scherrer Institute, Switzerland, and E. Riedo of Georgia Tech, ICEM12 in Bari, Italy on August 29 – September 2, 2004.

- “Symposium on Nanotechnology and MEMS: Experiments and Modeling,” co-organized with R. Ballarini and W. Knauss, the 14th US National Congress of Applied Mechanics in Virginia Tech, Blacksburg, Virginia, June 23-28, 2002.
- “Sessions on Nanoscale Measurements in Fracture and Fatigue,” co-organized with Paul Labossière, the US Society for Experimental Mechanics 2002 Annual Conference, Milwaukee, Wisconsin, June 10-12, 2002.
- “Symposium on Modeling and Simulation of Micro and Nano Systems,” co-organized with Ted Belytschko, Wing-Kam Liu, Mark Horstemeyer, and Helena Van Swygenhoven, the 6th U.S. National Congress on Computational Mechanics, Dearborn, Michigan, August 1-4, 2001.
- “Symposium on Experiment and Modeling of Failure of Modern Materials,” co-organized with Mohammed Zikry and Ghatu Subhash, the 2001 Applied Mechanics and Materials Summer Conference, La Jolla, California, June 27-29, 2001.
- “Symposium on Advances in Failure Mechanisms in Brittle Materials,” co-organized with R.J. Clifton, 1996-ASME Winter Annual Meeting, Atlanta, Georgia, November 1996.

TEACHING

Courses Taught at Northwestern University:

- Experiments in Micro/Nano Science and Engineering, W03, W04, W05, S09, S11-17, W18, S19, S21
- Experimental Solid Mechanics, S20, S21
- Special Topics in Cell Mechanics and BioMEMS, S12, S15, F16, S18
- Introduction to MEMS, W00, W01, F02, F03, F04, F06, F07, F08, F09, F10, F11-21
- Special Topics in Nano Engineering, W08
- Experimental Engineering, S00, F00, S01, F01, S02, S03, S04, F05, S08, S09
F=Fall, S=Spring, W=Winter (Quarter System)

Courses Taught at Purdue University:

- Elasticity in Aerospace Engineering, F94
- Damage and Inelasticity of Advanced Materials, S94, S95, S96, S97
- Finite Element Methods in Aerospace, F95, F97
- Advanced Computational Mechanics, S97
- Aeromechanics II (Mechanics of Materials), F92, S92, F93, S96
- Aircraft Structures, F93, S94, F94, S95, S98
- Design of Reinforced Concrete Structures, S85
- Dynamics of Structures, F85
F=Fall, S=Spring (Semester System)

PUBLICATIONS AND PATENTS

Books and Featured Articles:

1. Nano and Cell Mechanics – Fundamental and Frontiers, edited by H.D. Espinosa and G. Bao, Wiley, 2013
2. Feature article in International Innovation, "Probing at the atomic scale" North America, September 2013, p. 12-13.

Patents and Disclosures:

1. H.D. Espinosa, Eric Jason Berns, Milan Mrksich, Prithvijit Mukherjee, Cesar Andres Patino, "Microfluidic Device for Live Cell Manipulation and Analysis," Oct. 2020 (Utility # 17/511,246)
2. H.D. Espinosa, S.S.P. Nathangari, S. Dong, "An experimental tool for combined in-vacuo Raman Spectroscopy and Cavity-Interferometry characterizations of suspended micro and nano-structures," 2020, NU Disclosure.
3. H.D. Espinosa, "A microfluidic, live-cell analysis device (L-CAD) for high throughput, non-destructive, single-cell transfection and temporal cytosolic sampling," 2016, NU Disclosure.
4. H.D. Espinosa and M. Minary, "A microdevice for electroporation of single cells using fluidic scanning probes and related method," 2012, NU Disclosure.
5. H.D. Espinosa and N.A. Moldovan, "Microchannel forming method and nanotipped dispensing device having a microchannel," 2012 (US patent 8347696 B2, 2012).
6. H.D. Espinosa and F. Barthelat, "Segmented Layered Composite with Dovetail Shaped Tablets Inclusions: "Nacre" Composite, NU Disclosure No. 26164, 2012 (US patent 8,176,705)
7. H.D. Espinosa, N.A. Moldovan, and K.-H. Kim, "Nanotipped device and method," 2011 (US Patents 9,278,852).
8. H.D. Espinosa and W. Filleter, "A Methodology to Increase the Strength and Stiffness of Hierarchical Carbon Nanotube Bundles by Electron Irradiation Induced Crosslinking," 2011 (Utility # 61/478,004).
9. H.D. Espinosa, O. Loh, X. Wei, "Electrode Designs to Improve Reliability of Nanoelectromechanical Systems," 2010, NU Disclosure.
10. H.D. Espinosa and Rodrigo Bernal, "Four-terminal Electromechanical Characterization in-situ TEM," NU Disclosure No. 29155, 2009 (US 9,279,753).

11. H.D. Espinosa and B. Peng, "A Methodology to Increase the Stiffness of Multi-Wall Nanotubes and Nanotube Bundles by Radiation Induced Crosslinking," 2008, NU Disclosure.
12. H.D. Espinosa and B. Peng, "A Microelectromechanical Device for Electromechanical Characterization of Nanostructures in-situ TEM," 2009, NU Disclosure.
13. H.D. Espinosa, N.A. Moldovan and K.-H. Kim, "Nanotipped device and method," NU Disclosure No. 23014 2007 (US Patents 7,250,139).
14. H.D. Espinosa, N.A. Moldovan and K.-H. Kim, "Nanotipped device and method," 2007 (US Patents 7,997,123).
15. H.D. Espinosa and F. Barthelat, "Nacre Composites, Methods of Synthesis, and Methods of Use," 2006 (US patent 8,067,078)
16. H.D. Espinosa and N. Moldovan, "Atomic Force Microscopy (AFM) Chip for Conductive Contact Mode Techniques Made of Nanocrystalline Diamond Thin Films – Design and Fabrication," NU Disclosure No. 25075, 2005 (Utility No. 60/702,544 filed July 26, 2005).
17. H.D. Espinosa, C-H. Ke, and N.A. Moldovan "Nanocantilever Bistable Tunneling Proximity Sensor/Probe," NU Disclosure No. 24071, 2004 (US patent 7,612,424).
18. H.D. Espinosa and Y. Zhu, "A Microelectromechanical Device Used for *In-Situ* Electron Microscopy, Scanning Probe Microscopy and X-Ray Diffraction Mechanical Testing of Nanostructures," NU Disclosure No. 24085, 2004.
19. H.D. Espinosa, B. Prorok and M. Fischer, "A Novel Microscale Mechanical Test for Evaluating the Elasticity, Plasticity and Fracture of Thin Films and MEMS materials," NU Disclosure No. 22038, 2002, (Utility # 60/385,781).

Refereed Journal Publications (h-index=77, source Google Scholar)

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