

Pablo Daniel Zavattieri

Full Professor

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Education:

Ph.D., School of Aeronautics and Astronautics, Purdue University, West Lafayette, IN, U.S.A. December 2000

Major: Materials and Structures

Specialization: **Computational Engineering**, Computer Science & Engineering (CS&E program)

Ph.D. Thesis Research: “*Computational Modeling for Bridging Size Scales in the Failure of Solids*”.

Advisor: Prof. Horacio Espinosa

B.Sc. / M.Sc., (6 years program with thesis) Nuclear Engineering, Computational Mechanics Group, Instituto Balseiro, Universidad Nacional de Cuyo, San Carlos de Bariloche, Argentina, June 1995.

M.Sc. Thesis Research: “*Finite element mesh optimization in three dimensions*”.

Advisors: Profs. Gustavo Buscaglia and Enzo Dari

Work Experience and Academic Appointments:

8/17-Present **Full Professor**, Lyles School of Civil Engineering, Purdue University, W. Lafayette, IN, USA.

8/15-Present **University Faculty Scholar**, Purdue University, W. Lafayette, IN, USA.

8/14-2017 **Associate Professor (early tenure)**, Lyles School of Civil Engineering, Purdue University, W. Lafayette, IN, USA.

- 8/09-7/14 **Assistant Professor**, School of Civil Engineering, Purdue University, W. Lafayette, IN, USA.
- 8/09-7/11 **Assistant Professor**, School of Mechanical Engineering (By Courtesy), Purdue University, W. Lafayette, IN, USA.
- 8/08-7/09 **Adjunct Assistant Professor**, School of Mechanical Engineering, Purdue University, W. Lafayette, IN, USA.
- 8/08-7/09 **GM Engineer-in-residence at Purdue**, General Motors (1 year at the School of Mechanical Engineering, Purdue University)
- 6/08-7/09 **Staff Researcher**, General Motors Research and Development Center, Warren, MI, USA.
- 3/07-12/07 **Materials Engineer**, Materials and Corrosion Engineering, General Motors Corporation, Warren, MI, USA.
- 1/01-5/08 **Senior Researcher**, General Motors Research and Development Center, Warren, MI, USA.
- 8/01- 7/02 **Visiting Professor** at the Department of Aeronautics, School of Engineering, Universidad Nacional de la Plata, La Plata, Argentina
- 8/96-12/00 **Research Assistant** in the School of Aeronautics and Astronautics, Purdue University, W. Lafayette, IN, USA.
- 1/96-7/96 **Visiting Scholar** in the School of Aeronautics and Astronautics, Purdue University, W. Lafayette, IN, USA.

Awards and Honors:

1. **NSF Faculty Early Career Development (CAREER) award**, *National Science Foundation, 2013.*
2. **Roy E. & Myrna G. Wansik Research Award**. *Lyles School of Civil Engineering, Purdue University, 2013. This annual award was created to recognize an outstanding researcher in the School of Civil Engineering.*
3. **IM:PACT fellow** (*Instruction Matters: Purdue Academic Course Transformation*), *Purdue University, 2013.*
4. **Frontier of Engineering Alumnus (USFOE)**, *National Academy of Engineering (NAE), 2014.*
5. **Kavli Frontier of Science Fellow**, *National Academy of Science (NAS), 2015.*
6. **University Faculty Scholar**, *Purdue University, 2015. University Faculty Scholars are select associate and full professors who have been in that rank for no more than five years and are on an accelerated path toward academic distinction. In the College of Engineering, they are nominated by committees from their academic areas, and reviewed and recommended by a subcommittee of the College's named and distinguished professors. The dean makes the selection and requests approval by the*

provost. University Faculty Scholars receive additional funding to support their research.

7. **Seeds for Success ACORN Award**, Purdue University, 2015. The Office of the Vice President for Research gives this award in recognition of the accomplishments of single investigators and teams of investigators for their efforts in obtaining a \$1 million dollar or more research grant. Prof. Zavattieri received the bronze acorn in recognition of his contribution in acquiring two million dollar awards.
8. **2016 HIVE 100 Innovator**, Builder Magazine (Hanley Wood editorial). In recognition of the pioneering, disrupting and transforming work on nanocellulose-reinforced cements. Together with Robert Moon (USFS), J. Youngblood and J. Weiss.

Other awards:

Paper awards, front pages and recognitions:

1. Award to the **Engineering Fracture Mechanics** Journal Most Cited Articles in the 2005 to 2009 period. For the paper entitled “*Mixed-mode cohesive-zone models for fracture of an adhesively bonded polymer-matrix composite*”.
2. Second Most Cited **Journal of the Mechanics and Physics of Solids** Article between 2007 and 2012. For the paper entitled “*On the mechanics of mother-of-pearl: A key feature in the material hierarchical structure*”
3. Cover page of the journal **Cellulose** (impact factor: 3.033), Nov. 2013
https://engineering.purdue.edu/~zavattie/research-projects/Cellulose_Cover.jpg
4. Cover page of the journal **Advance Functional Materials** (impact factor: 10.4), Oct. 2014. https://engineering.purdue.edu/~zavattie/adfm201470255_cover_page.pdf

Travel awards:

1. **Purdue Research Foundation International travel award**. For organizing/ chairing sessions and participating at the XXI Iberian-Latin-American Congress on Computational Methods in Engineering/II South American Congress on Computational Mechanics, Buenos Argentina, Nov. 15-18, 2010.
2. **National Science Foundation (NSF) funded travel award** to attend the Twelfth Pan American Congress of Applied Mechanics (PACAM XII) will be held in Port of Spain, Trinidad in January 2012. 1.
3. **National Science Foundation (NSF) funded travel award** to attend, chair a session and deliver a key invited presentation at the International US-Poland workshop on Multiscale Computational Modeling of Cementitious Materials (MCMoCM 2012) held in Cracow, Poland, October 18-19, 2012.
4. **National Science Foundation (NSF) funded travel award** to attend, chair a session and deliver a key invited presentation at the International US-Poland workshop on Multiscale Computational Modeling of Cementitious Materials (MCMoCM 2012) held in Cracow, Poland, October 18-19, 2012.

5. **National Science Foundation (NSF) travel award** to attend and teach at the workshop: "Polymer and Composite Materials from Renewable Resources and Biorefinery: from Chemistry to Applications". August 5-16, 2013, San Jose, Costa Rica, National Science Foundation (NSF) as part of the Pan American Student Institute (PASI-USA).
6. **2013 Purdue Research Foundation International Travel Award.** For organizing and presenting at the NSF Pan American Advanced Studies Institute (PASI) on Polymer and Composite Materials from Renewable Resources and Biorefinery: from Chemistry to Applications, Costa Rica, August 2013.
7. **2014 Purdue Research Foundation International Travel Award.** For giving a plenary talk at the XXI Congress on Numerical Methods and their Applications (ENIEF 2014) in Bariloche, Patagonia, Argentina.

Fellowships:

1. Full fellowship to study at Balseiro Institute. Granted by the National Atomic Energy Commission, Argentina, 1991-1995. *The Balseiro Institute is a very prestigious university located in the south of Argentina in which only 30 students are accepted each year after a very selective exam. Each student receives a full fellowship and they are required to previously complete the first two years in engineering or physics program at any university. After 4 years at the institute -6 years in total- the degree of engineer or physicist is recognized as a Masters degree in other international institutions.*
2. Fellowship to pursue graduate studies at Balseiro Institute. Granted by the National Atomic Energy Commission, Argentina, Aug-Dec, 1995.
3. Full Research fellowship granted by the National Scientific and Technical Research Council (CONICET) to pursue doctorate studies, Argentina, 1996. Granted but declined by PDZ to pursue studies in the U.S..

Original Research Work

Google Scholar: h-index: 30 (Citations 3720) <https://goo.gl/WTismF>
Research Gate: RG Score 34.68¹ (July 2017)

Dissertations:

- Master Thesis: "Finite element mesh optimization in three dimensions" presented at Instituto Balseiro, S. C. de Bariloche, Argentina, in June 1995.

¹ https://www.researchgate.net/profile/Pablo_Zavattieri/reputation?ev=prf_rep_header

- Ph.D. Thesis: "Computational Modeling for Bridging Size Scales in the Failure of Solids", presented at the School of Aeronautics and Astronautics, Purdue University, U.S.A. in December 2000. Advisor: Horacio Espinosa

Refereed Journal Publications:

- [1] P.D. Zavattieri, E. A. Dari and G. C. Buscaglia, "*Optimization strategies in unstructured mesh generation*", **International Journal for Numerical Methods in Engineering**, 39, pp. 2055-2071, 1996.
- [2] P.D. Zavattieri, G. C. Buscaglia and E. A. Dari, "*Finite element mesh optimization in three dimensions*", **Latin American Applied Research**, 26 pp. 233-236, 1996.
- [3] H. D. Espinosa, P. D. Zavattieri and G. L. Emore, "*Adaptive FEM Computation of geometric and material nonlinearities with application to brittle failure*", special issue of **Mechanics of Materials** edited by H.D. Espinosa and R.J. Clifton, 29, pp. 275-305, 1998.
- [4] H. D. Espinosa, S. Dwivedi, P. D. Zavattieri and G. Yuan, "*Numerical investigations of penetration in multilayered material/structure systems*", **International Journal of Solids and Structures**, 35(22), pp. 2975-3001, 1998.
- [5] H. D. Espinosa, P. D. Zavattieri and S. Dwivedi, "*A finite deformation continuum/discrete model for the description of fragmentation and damage in brittle materials*", **Journal of the Mechanics and Physics of Solids**, 46(10), pp. 1909-1942, 1998.
- [6] H.D. Espinosa, H-C. Lu, P.D. Zavattieri, and S. Dwivedi, "*A 3-D finite deformation anisotropic visco-plasticity model for fiber composites*", **Journal of Composite Materials**, 35(5), pp. 369-409, 2001.
- [7] P.D. Zavattieri, P.V. Raghuram and H.D. Espinosa, "*A computational model of ceramic microstructures subjected to multi-axial dynamic loading*", **Journal of the Mechanics and Physics of Solids**, 49(1), pp. 27-68, 2001.
- [8] P.D. Zavattieri and H.D. Espinosa, "*Grain level analysis of crack initiation and propagation in brittle materials*", **Acta Materialia**, 49, pp. 4291-4311, 2001.
- [9] P.D. Zavattieri and H.D. Espinosa, "*An examination of the competition between bulk behavior and interfacial behavior of ceramics subjected to dynamic pressure-shear loading*", **Journal of the Mechanics and Physics of Solids**, 51(4), pp. 607-635, 2002.
- [10] H.D. Espinosa and P.D. Zavattieri, "*A grain level model for the study of failure initiation and evolution in polycrystalline brittle materials. Part I: Theory and numerical implementation*", **Mechanics of Materials**, 35(3-6), pp. 333-364, 2003.

- [11] H.D. Espinosa and P.D. Zavattieri, "A grain level model for the study of failure initiation and evolution in polycrystalline brittle materials. Part II: Numerical examples", **Mechanics of Materials**, 35(3-6), pp. 365-394, 2003.
- [12] S. Li, M.D. Thouless, A.M. Waas, J. Schroeder, P.D. Zavattieri, "Use of Mode-I cohesive-zone models to describe the fracture of an adhesively-bonded polymer-matrix composite", **Composites Science and Technology**, 65(2), pp. 281-293, 2005.
- [13] S. Li, M.D. Thouless, A.M. Waas, J. Schroeder, P.D. Zavattieri, "Use of a cohesive-zone model to analyze the fracture of a fiber-reinforced polymer-matrix composite", **Composites Science and Technology**, 65(3-4), pp. 537-549, 2005.
- [14] S. Li, M.D. Thouless, A.M. Waas, J. Schroeder, P.D. Zavattieri, "Competing failure mechanisms in mixed-mode fracture of an adhesively-bonded polymer-matrix composite", **International Journal of Adhesion and Adhesives**, 26(8), pp. 609-616, 2006.
- [15] P. Zavattieri, "Modeling of crack propagation in thin-walled structures with a cohesive model for shell elements", special issue on Computational Mechanics of **Journal of Applied mechanics**, 73(6), pp. 948-958, 2006.
- [16] F. Barthelat, H. Tang, P.D. Zavattieri, C-M. Li and H.D. Espinosa, "On the mechanics of mother-of-pearl: A key feature in the material hierarchical structure", **Journal of the Mechanics and Physics of Solids**, 55(2), pp. 306-337, 2007.
- [17] M.A. Sutton, J. Yan, X. Deng, C.-S. Cheng, P. Zavattieri, "Three-dimensional digital image correlation to quantify deformation and crack-opening displacement in ductile aluminum under mixed-mode I/III loading", **Journal of Optical Engineering**, 46(5), 051003, 2007.
- [18] P.D. Zavattieri, L.H. Hector Jr., A.F. Bower, "Determination of the mode-I effective fracture toughness of a sinusoidal interface between two elastic solids", **International Journal of Fracture**, 145(3), pp. 167-180, 2007.
- [19] P. Zavattieri, L. Hector, Jr. and A.F. Bower "Determination of the Effective Mode I Toughness of a Sinusoidal Interface between two Elastic Solids," **International Journal of Fracture**, 146, (1) 123-124, 2007.
- [20] P.D. Zavattieri, L.H. Hector Jr., A.F. Bower, "Cohesive zone simulations of crack growth along a rough interface between two elastic plastic solids", **Engineering Fracture Mechanics**, 75(15), pp. 4309-4332, 2008.
- [21] H. Tao, W. Tong, L. Hector, P. Zavattieri, "Uniaxial tensile and simple shear behavior of resistance spot welds in dual-phase steel", **Journal of Materials Engineering and Performance** 17 (4) pp. 517-534. (2007), doi: 10.1007/s11665-007-9170-8, 2007.
- [22] C. Sun, M.D. Thouless, A.M. Waas, J.A. Schroeder, P.D. Zavattieri "Ductile-brittle transition in the fracture of plastically-deforming adhesively-bonded structures. Part I: Experimental studies", **International Journal of Solids and Structures**, 45 (10), pp. 3059-3073, 2008.

- [23] C. Sun, M.D. Thouless, A.M. Waas, J.A. Schroeder, P.D. Zavattieri “*Ductile-brittle transition in the fracture of plastically-deforming adhesively-bonded structures. Part II: Numerical studies*” **International Journal of Solids and Structures**, 45 (17), pp. 4725-4738, 2008.
- [24] C. Sun, M.D. Thouless, A.M. Waas, J.A. Schroeder, P.D. Zavattieri, “*Rate Effects for Mode-II Fracture of Plastically Deforming, Adhesively-Bonded Structures*”, **International Journal of Fracture**, 156(2), pp. 111-128, 2008.
- [25] C. Sun, M.D. Thouless, A.M. Waas, J.A. Schroeder, P.D. Zavattieri, “*Rate Effects for Mixed-Mode Fracture of Plastically Deforming, Adhesively-Bonded Structures*,” **International Journal of Adhesion and Adhesives**, 29, (4), pp. 434-443, 2009.
- [26] P. Zavattieri, L.H. Hector Jr. V. Savic, J. Fekete, W. Tong “*Spatio-temporal characteristics of the Portevin–Le Châtelier effect in austenitic steel with twinning induced plasticity*”, **International Journal of Plasticity**, 25, pp. 2298-2330, 2009.
- [27] J.-H Yan, M. A. Sutton , X. Deng, Z. Wei and P. Zavattieri, “*Mixed-mode Crack Growth in Ductile Thin-sheet Materials under Combined In-plane and Out-of-plane Loading*”, **International Journal of Fracture**, 160(2), pp. 169-188 2009.
- [28] L.G. Hector, P.D. Zavattieri, H. Tao and W. Tong, “*Mode I fracture in the vicinity of a spot weld in 600 grade dual-phase steel: An application of reverse digital image correlation*”, **Experimental Mechanics**, 50(8), pp. 1199-1212, 2010.
- [29] J. Yan, M. Sutton, Z. Wei, X. Deng, P. Zavattieri, “*Hybrid Experimental and Computational Studies: Combined Compression-Bending Fracture of Edge-Cracked Polypropylene Specimens*”, **Fatigue and Fracture of Engineering Materials and Structures**, 33(12), pp. 791–808, 2010.
- [30] J.E. Rim, P.D. Zavattieri, A. Juster, H.D. Espinosa, “*Dimensional analysis and parametric studies for designing artificial nacre*“, **Journal of the Mechanical Behavior of Biomedical Materials**, 4(2), pp. 190-211, 2011.
- [31] B. Reedlunn, S. Daly, L. Hector Jr., P. Zavattieri, J. Shaw, “*Tips & Tricks for characterizing shape memory wire. Part 5: Full-field strain measurement by Digital Image Correlation*”, **Experimental Techniques**, DOI: 10.1111/j.1747-1567.2011.00717.x, 2011.
- [32] H.Espinosa, A. Juster, F. Latourte, D. Gregoire, O.Loh, P. Zavattieri.,”*Lessons in Abalone shell toughness applied to synthetic materials*”, **Nature Communications**, 2, 173, doi:10.1038/ncomms1172, 2011.
- [33] Z. Wei, X. Deng, M.A. Sutton, J. Yan, C.-S. Cheng, P. Zavattieri, “*Modeling of Mixed-Mode Crack Growth in Ductile Thin Sheets under Combined In-Plane and Out-of-Plane Loading*”, **Engineering Fracture Mechanics**, 78(17),pp. 3082–3101, 2011.

- [34] F. C. Antico, P D Zavattieri, L. G. Hector, Jr ., A Mance., W R Rodgers and D A Okonski, *Adhesion of nickel-titanium shape memory alloy wires to thermoplastic materials: Theory and experiments*, **Smart Materials and Structures**, 21, 035022, 2012.
- [35] J.C. Weaver, G.W. Milliron, A. Miserez, K.Evans-Lutterodt, S. Herrera, I. Gallana, WJ Mershon, B. Swanson, P.Zavattieri, E.DiMasi, D.Kisailus, “*The Stomatopod Dactyl Club: A Formidable Damage-Tolerant Biological Hammer*”, **Science**, 336 (no. 6086), pp. 1275-1280, 2012.
- [36] F. Cordisco, P.D. Zavattieri, L.H. Hector Jr., A.F. Bower, “*Toughness of a patterned interface between two elastically dissimilar solids*”, **Engineering Fracture Mechanics**, 96, pp. 192-208, 2012.
- [37] F. Dri, L.G. Hector Jr. R. Moon, P.D. Zavattieri, "Anisotropy of the Properties of Crystalline Cellulose I β from First Principles Density Functional Theory with Van der Waals Interactions”, **Cellulose**, 20(6), pp. 2703-2718, 2013. [including artwork in Cover page]
- [38] X. Chen, X. Deng, M. A. Sutton, P. Zavattieri, “An Inverse Analysis of Cohesive Zone Model Parameter Values for Ductile Crack Growth Simulations”, **International Journal of Mechanical Sciences**, 79, pp. 206-215, 2014.
- [39] L.K. Grunenfelder, N. Suksangpanya, C. Salinas, G. Milliron, N. Yaraghi, S. Herrera, K. Evans-Lutterodt, S.R. Nutt, P. Zavattieri, D. Kisailus, “Bio-Inspired Impact Resistant Composites”, **Acta Biomaterialia**, 10(9), pp. 3997-4008, 2014.
- [40] L.K. Grunenfelder, E. Escobar de Obaldia, Q. Wang, D. Li, B. Weden, C. Salinas, R. Wuhner, P. Zavattieri* and D. Kisailus, “Stress and Damage Mitigation from Oriented Nanostructures within the Radular Teeth of *Cryptochiton stelleri*”, **Advanced Functional Materials**, 24(39), pp. 6085-6240, 2014 (DOI: 10.1002/adfm.201401091) [Cover Page]
- [41] X. Chen, X. Deng, M. Sutton, P. Zavattieri, “Simulation of mixed-mode I/III stable tearing crack growth events using the cohesive zone model approach”, **International Journal of Fracture**, 189(1), pp. 59-75, 2014.
- [42] F. Cordisco, P. Zavattieri, L.G. Hector, A. Bower, “On the mechanics of sinusoidal interfaces between dissimilar elastic-plastic solids subject to dominant mode I”, **Engineering Fracture Mechanics**, 131, pp 38–57, 2014.
- [43] F. Dri, S Shang, L.G. Hector Jr, P. Saxe, Z-K Liu, R. Moon and P.D. Zavattieri, "Anisotropy and temperature dependence of structural, thermodynamic, and elastic properties of crystalline cellulose I β : a first-principles investigation", **Modelling and Simulation in Materials Science and Engineering**, 22 085012, 2014.
- [44] Y. Cao, P. Zavattieri, J. Youngblood, R. Moon, J. Weiss, "The influence of cellulose nanocrystal additions on the performance of cement paste", **Cement and Concrete Composites**, 56, pp. 73-83, 2014.
- [45] Enrique Escobar de Obaldia ,Chanhue Jeong, Lessa Kay Grunenfelder, David Kisailus and Pablo Zavattieri* *Analysis of the mechanical response of anisotropic*

- biological materials through 3D printing, mechanical testing and modeling*, **Journal of the Mechanical Behavior of Biomedical Materials**, 48, pp. 70-85, 2015.
- [46] Nicolás Guarín-Zapata, Juan Gomez, Nick Yaraghi, David Kisailus, Pablo D. Zavattieri, “*Shear Wave Filtering in Naturally-Occurring Bouligand Structures*”, **Acta Biomaterialia**, 23, pp. 11-20, 2015., 2015.
- [47] W. Gao , Y. Zhang , D. Ramanujan , K. Ramani , Y. Chen, C. B. Williams , C. C. L. Wang, Y.C. Shin, S. Zhang, P. D. Zavattieri, “*The Status, Challenges, and Future of Additive Manufacturing in Engineering*”, **Computer-Aided Design**, 2015. doi:10.1016/j.cad.2015.04.001
- [48] F.C. Antico, I. De la Varga, H.S. Esmaeli, T.E. Nantung, P.D. Zavattieri, W.J. Weiss, “*Using accelerated pavement testing to examine traffic opening criteria for concrete pavement*”, **Construction and Building Materials**, 96, pp. 86-95, 2015.
- [49] F.L. Dri, X. Wu, R.J. Moon, A. Martini, P.D. Zavattieri, “*Evaluation of reactive force fields for prediction of the thermo-mechanical properties of cellulose I β* ”, **Computational Materials Science**, 109, pp. 330-340, 2015.
- [50] D. Restrepo, N.D. Mankame, P.D. Zavattieri, “*Phase Transforming Cellular Materials*”, **Extreme Mechanics Letters**, 4, pp. 52-60 2015. doi:10.1016/j.eml.2015.08.001
- [51] H. S. Esmaeli¹, Y. Farnam, D. P. Bentz, P. D. Zavattieri¹, and J. Weiss,” *Numerical Simulation of the Freeze-Thaw Behavior of Mortar Containing Deicing Salt Solution*”, in revision, **Materials and Structures**, 2015.
- [52] F.A. Cordisco, P.D. Zavattieri, L.G. Hector, B.E. Carlson, “*Mode I Fracture Along Adhesively Bonded Sinusoidal Interfaces*”, in revision, **International Journal of Solids and Structures**, 2015.
- [53] Y. Suzuki, G. Cardone, D. Restrepo, P. D. Zavattieri, T. S. Baker, F.A. Tezcan, “*Designed Self-Assembly of Coherently Dynamic, Auxetic Two-Dimensional Protein Crystals*”, **Nature**, 533 (7603), 369–373, 2016.
- [54] Y. Cao; P. Zavattieri; J. Youngblood; R. Moon, J. Weiss, “*The relationship between cellulose nanocrystal dispersion and strength*”, **Construction & Building Materials**, 119, pp. 71–79, 2016.
- [55] D. Restrepo, N.D. Mankame and P.D. Zavattieri , “*Programmable materials based on periodic cellular solids. Part I: Experiments*”, **International Journal of Solids and Structures**, 100-101, pp. 485–504, 2016.
- [56] D. Restrepo, N.D. Mankame and P.D. Zavattieri, “*Programmable materials based on periodic cellular solids. Part II: Numerical analysis*”, **International Journal of Solids and Structures**, 100-101, pp. 505–522, 2016.
- [57] E. Escobar de Obaldia, S. Herrera, L.K. Grunenfelder, D. Kisailus, P.D. Zavattieri, “*On the mechanics of naturally-occurring rod-like microstructures*”,

- submitted to **Journal of the Mechanics and Physics of Solids**, 96, pp. 511-534, 2016.
- [58] N.A. Yaraghi, N. Guarín-Zapata, L.K. Grunenfelder, J.-Y.Jung, J. McKittrick, R. Wuhler, P.D. Zavattieri, D. Kisailus, “*Herringbone-Modified Bouligand Structure Enhances Stress Redistribution in the Stomatopod Dactyl Club Exocuticle*”, **Advanced Materials**, 28(32), pp. 6835–6844, 2016.
- [59] Y. Cao; P. Zavattieri; J. Youngblood; R. Moon, J. Weiss, “*Microstructures of cement pastes with raw and ultrasonicated cellulose nanocrystals*”, **Cement and Concrete Composites** 74, pp. 164-173, 2016
- [60] H. S. Esmaeeli, Y. Farnam, D. P. Bentz, P. D. Zavattieri, and J. Weiss,” Numerical Simulation of the Freeze-Thaw Behavior of Mortar Containing Deicing Salt Solution”, **Materials and Structures**, 2016.
- [61] C.L. Salinas, E. Escobar, C. Jeong, J. Hernandez, P. Zavattieri, D. Kisailus, “Enhanced Toughening of the Crossed Lamellar Structure Revealed by Nanoindentation”, **Journal of the Mechanical Behavior of Biomedical Materials**, DOI: 10.1016/j.jmbbm.2017.05.033, 2017.
- [62] N. Suksangpanya, D. Kisailus, P. Zavattieri, “*Twisting cracks in Bouligand structures*. **Journal of the Mechanical Behavior of Biomedical Materials**, DOI: 10.1016/j.jmbbm.2017.06.010
- [63] M. Shishehbor, F. L. Dri, R. J. Moon, P. D. Zavattieri, “*A continuum mechanics approach for the modeling and simulation of crystalline cellulose*”, to be submitted in Summer 2017.
- [64] N. Suksangpanya, M. Jones, D. Kisailus, P. Zavattieri, “*Fracture Analysis on the Bouligand Structure in Stomatopod Dactyl Club under mode I Uniaxial Loading: 3D printing, mechanical testing and modeling*”, in preparation, to be submitted in Summer 2017.
- [65] L.K. Grunenfelder, G. Milliron, S. Herrera, I. Gallana, N. Yaraghi, N.C. Hughes, K. Evans-Ludderodt, P. Zavattieri, D. Kisailus, “*Influence of impact mechanics and feeding behavior on the development of cuticle structure in stomatopods*”, to be submitted in 2017.

Refereed Conference Papers:

- [66] G. C. Buscaglia, E. A. Dari and P. D. Zavattieri, "Mesh Optimization in three dimensions", IV Congreso de Mecánica Computacional, Vol. 14, 505-511, Mar del Plata, Argentina, Nov. 1994. (Talk given by P.D. Zavattieri)
- [67] G. C. Buscaglia, E. A. Dari and P. D. Zavattieri, "Mesh optimization: Some results in 3D elasticity", Elasticite, Viscoelasticite; et Controle Optimal, ESAIM: Proc. 2, pp. 1-16. Lyon, France, 1997.
- [68] H. D. Espinosa, P. D. Zavattieri, and G. L. Emore, "Computational modeling of geometric and material nonlinearities with application to impact damage in brittle failure", in *Advances in Failure Mechanisms in Brittle Materials*, edited by R.J.

- Clifton, and H.D. Espinosa, ASME Winter Annual Meeting, pp. 119-161, Atlanta, GA, Nov. 17-22, 1996.
- [69] H. D. Espinosa, H-C. Lu, S. Dwivedi and P. D. Zavattieri, "A finite deformation anisotropic plasticity model for fiber reinforced composites", in Proc. of 12th Annual Technical Conf. of the American Society for Composites, edited by Ronald F. Gibson and Golam M. Newaz, pp. 429-441, Dearborn, MI, 1997.
- [70] H. D. Espinosa, G. Yuan, S. Dwivedi and P. D. Zavattieri, "Numerical study of penetration in ceramic targets with a multiple-plane model", Proc. of 97 APS topic Conf. of Shock Compression of Condensed Matter-1997, edited by S.C. Schmidt, D.P. Dandekar and J.W. Forbes, pp. 901-904, Amherst, MA, July 27 - Aug. 1, 1997.
- [71] N. S. Brar, H. D. Espinosa, G. Yuan and P. D. Zavattieri, "Experimental study of interface defeat in confined ceramic targets", Shock Compression of Condensed Matter-1997, edited by S.C. Schmidt, D.P. Dandekar and J.W. Forbes, pp. 497-500, Amherst, MA, July 27- Aug. 1, 1997.
- [72] H. D. Espinosa and P. D. Zavattieri, "Modeling of ceramic microstructures: dynamic damage initiation and evolution", Invited paper presented at the APS Meeting on Shock Wave and Condensed Matter, Snowbird, UT, June 27 to July 2, 1999, Proceedings, pp. 333-338. (Invited Key Talk given by P.D. Zavattieri)
- [73] P. D. Zavattieri and H. D. Espinosa, "Ballistic penetration of multi-layered ceramic/steel targets", poster presented at the APS Meeting on Shock Wave and Condensed Matter, Snowbird, UT, June 27 to July 2, 1999. Proceedings, pp. 1117-1120, (Poster presented by P.D. Zavattieri)
- [74] P.D. Zavattieri and H.D. Espinosa, "Grain level analysis of ceramic microstructures subjected to impact loading", Ceramic Transactions pp. 349-360. 4-8, the Proceedings of Ceramic Armor Materials by Design Symposium, PACRIM IV, An International Conference on Advanced Ceramics and Glasses, November 4-8, Wailea, Maui, Hawaii, Nov. 2001
- [75] P. D. Zavattieri, "Modeling of crack propagation in thin-walled structures", Mecánica Computacional, Vol. XXIII, G. Buscaglia, E. Dari, O.Zamonsky (Eds.) XIV Congress on Numerical Methods and their Applications ENIEF 2004, to be held in S. C. de Bariloche, Nov. 8-11, 2004. (Invited Key Talk)
- [76] J.H. Yan, M.A. Sutton, X. Deng, P. Zavattieri, Z. G. Wei, "Mixed-mode crack growth in ductile thin sheet materials", SEM Annual Conference & Exposition on Experimental and Applied Mechanics, 2009. Albuquerque, New Mexico US, June 1 - 4, 2009
- [77] L.G. Hector, Jr, P.D. Zavattieri, "Nucleation and propagation of Portevin-Le Châtelier Bands in autenitic steel with twinning induced plasticity", Proceedings of the Society for Experimental Mechanics SEM Annual Conference & Exposition on Experimental and Applied Mechanics, Indianapolis, IN, June 7-10 2010.

- [78] D. Restrepo, N. D. Mankame and P. D. Zavattieri, "Shape Memory Polymer based Cellular Materials", *Mechanics of time-dependent materials and processes in conventional and multifunctional materials*, v. 3, Society for Experimental Mechanics, 2011. doi: 10.1007/978-1-4614-0213-8_15.
- [79] FC Antico, PD Zavattieri, L.G. Hector, "Adhesion of Nickel-Titanium Shape Memory Alloy Wires to Polymeric Materials: Theory and Experiment" *proceedings of TMS Conference*, 2012.
- [80] P.D. Zavattieri*, FC Antico*, "Multiscale cohesive zone modeling of cementitious materials: Current challenges, gaps and opportunities", *NSF International US-Poland Workshop: Multiscale Computational Modeling of cementitious Materials*.
- [81] Y. Farnam, H. Shagerdi Esmaeli, D. Bentz, P. Zavattieri, J. Weiss, "Experimental and Numerical Investigation on the Effect of Cooling/Heating Rate on the Freeze-Thaw Behavior of Mortar Containing Deicing Salt Solution", *International Conference on the Regeneration and Conservation of Concrete Structures (RCCS)*, Nagasaki, Japan, 2015.
- [82] N.A Yaraghi, L. Grunenfelder, N. Suksangpanya, N. Guarin, S. Herrera, G. Milliron, P. Zavattieri, L. Sheppard, R. Wuhrer, D. Kisailus, "Elemental and Phase Analysis of the Stomatopod Dactyl Club by X-Ray Mapping", *Microscopy and Microanalysis*, 21(s3), pp. 2007-2008, 2015.
- [83] John M. Cleveland, David Restrepo, Yunlan Zhang, Pablo Zavattieri, and Nilesh Mankame, "Mechanical Investigation of Phase-Transforming Cellular and Origami Materials" (August 4, 2016). The Summer Undergraduate Research Fellowship (SURF) Symposium. Paper 30. <http://docs.lib.purdue.edu/surf/2016/presentations/30>
- [84] Fennell, H., Coutinho, G. S., Magana, A. J., Restrepo, D., & Zavattieri, P. (2017). Enhancing student meaning-making of threshold concepts via computation: The case of Mohr's Circle. *Proceedings from the 124th ASEE Annual Conference and Exposition*, Columbus, OH. (Full paper)

Other Technical Reports:

- [1] P.D. Zavattieri, "Study of dynamic crack branching using intrinsic cohesive surfaces with variable initial elastic stiffness", *GM R&D-9650*, 2003.
- [2] P.D. Zavattieri, L.G. Hector Jr., J. Gullickson, A. Needleman, "Dislocation nucleation and propagation in the vicinity of a crack tip: Some limiting case results", *GM R&D-9649*, 2003.
- [3] F. Dri, R. Moon, P. Zavattieri, "Multiscale Modeling of the Hierarchical Structure of Cellulose Nanocrystals", in *Production and Applications of Cellulose Nanoparticles*, Ed. M.T. Postek, R. J. Moon, A. Rudie, M. Bilodeau, TAPPI Press. (June 2013).

- [4] Y. Cao, W.J. Weiss, J. Youngblood, R. Moon, P. Zavattieri, “Performance enhanced cementitious materials by cellulose nanocrystal additions”, in *Production and Applications of Cellulose Nanomaterials*. Ed. M.T. Postek, R. J. Moon, A. Rudie, M. Bilodeau, TAPPI Press. (June 2013).
- [5] D. Kisailus, P. Zavattieri, “Uncovering and Validating Toughening Mechanisms in High Performance Composites”, AFRL-AFOSR-VA-TR-2015-0306, 2015.

More than 30 internal research reports have been published internally in General Motors Research and Development.

Special issues:

Guest Editor, *International Journal of Experimental and Computational Biomechanics (IJEBCB)*, “*Polymer and Composite Materials from Renewable Resources and Biorefinery: from chemistry to applications.*”, vol. 3 (3), 2015.

Invited keynotes and plenary talks at conferences and symposia:

1. “Lessons learned from biomineralized marine organisms applied to the design of biomimetic materials”, the *Advances in Cement-based Materials: Characterization, Processing, Modeling and Sensing Meeting*, July 11-13, 2010, Purdue University, West Lafayette, IN. (Invited Talk)
2. “Inelastic deformation, hardening and competing failure mechanisms in biomineralized materials”, the *International Plasticity Conference*, Puerto-Vallarta Mexico, January 3-8, 2011. (Invited Talk)
3. “Biomimetic materials design: from biomineralized marine organisms to tough composite materials”, VIII Colombian Congress on Numerical Method, Medellin, Colombia, Aug. 10-12, 2011. (**Plenary**)
4. “Multiscale modeling of the hierarchical structure of cellulose nanocrystals”, 48th Annual Technical meeting of the Society of Engineering Science (SES 2011), Northwestern University on Oct. 12-14, 2011. (Keynote Speaker)
5. “Multiscale computational modeling for bridging size scales in the failure of cementitious-based materials: Recent progress, current challenges, gaps and opportunities”, NSF US-Poland workshop on Multiscale Computational Modeling of Cementitious Materials (MCMoCM 2012) Cracow, Poland, October 18-19, 2012 (**Plenary**)
6. “Multiscale mechanics of natural fibers”, NSF Pan American Advanced Studies Institute (PASI) on Polymer and Composite Materials from Renewable Resources and Biorefinery: from Chemistry to Applications, Costa Rica, August 2013. (**Plenary**)
7. "Mechanical Investigation of Biomineralized and Biologically-Inspired Materials: Lessons learned from Nature", I International Seminar on

- Biomaterials, Biomechanics and Regenerative Medicine, RutaN, Medellin, Colombia, May 16, 2014. (**Plenary**)
8. "Numerical Investigation of Naturally-Occurring High Performance Materials", XXI Congress on Numerical Methods and their Applications (ENIEF 2014), 23th-26th September 2014. (**Plenary**)
 9. "Combined 3D Printing and Multi-scale Modeling for the Development of Biomimetic Materials", Multiscale/3D Printing Cement Workshop, Vanderbilt University, July 16-17, 2015.
 10. "Combined 3D Printing and Multi-scale Modeling for the Development of High Performance Biomimetic Materials", I Seminar of Nanosurfaces: Advanced Processing and Characterization – II International Seminar on Biomaterials, Biomechanics and Regenerative Medicine, RutaN, Medellin, Colombia, Sept. 16-18, 2015.
 11. Mechanical investigation of growing twisting cracks in naturally-occurring Bouligand structures, Symposium SM9: Structure and Properties of Biological Materials and Bioinspired Designs 2016 MRS Spring Meeting and Exhibit, Phoenix, Arizona March 28-1, 2016.
 12. P. Zavattieri, Invited Plenary, 1st International Meeting on the Advanced Applications of Natural Biomaterials, Universidad de Antioquia, sede Rio Negro, Colombia, Sept. 27-30, 2016
 13. D. Restrepo, Y. Zhang, Nilesh D. Mankame and Pablo D. Zavattieri, "Phase transforming cellular materials: Design, fabrication and characterization", Invited Talk in the Symposium "Architected Metamaterials" Society of Engineering Science, 53rd Annual Technical Meeting, University of Maryland (UMD) during 2-5 October 2016.
 14. N. Suksangpanya, N. Guarin-Zapata, D. Kisailus, P. Zavattieri "Lessons Learned from the Mighty Dactyl Club of the Mantis Shrimp", Invited Talk at the Biological Materials Science (BMS) Symposium at 2017 TMS Annual Meeting & Exhibition in San Diego, CA (February 26 - March 2), 2017
 15. D. Restrepo. Y. Zhang, N. Mankame, P. Zavattieri, "Bioinspired Phase Transforming Cellular Materials", (Advanced Biomaterials session), 3rd Pan American Materials Congress San Diego, CA (February 26 - March 2), 2017.

Invited seminars:

1. "*Multiscale Modeling: A Hierarchical Approach to Investigate Dynamic Failure of Advanced Materials*", Computational Science & Engineering Seminar Series, **Purdue University**. Oct. 20, 1999.
2. "*Computational Modeling for Bridging Size Scales in the Failure of Solids*", Material & Processes Lab, **GM Research and Development**. May, 2001.
3. "*Applications of Cohesive Models: From Atoms to Autos*", School of Mechanical Engineering, **Purdue University**. Sept. 29, 2003.
4. "*Understanding Failure of Advanced Materials and Their Interfaces: A Key Enabler for Designing Future Vehicles*", School of Materials Engineering, **Purdue University**. Dec. 1, 2006.

5. “*Recent Progress and Current Challenges in Cohesive Zone Models Applied to the Failure of Automotive Structures*”, Department of Mechanical Engineering, **University of South Carolina**. Aug. 8th, 2007.
6. “*Bridging Size Scales in the Modeling of Deformation and Failure of Advanced Materials*”, School of Civil Engineering, **Purdue University**, April, 2009.
7. “*Lessons learned from biomineralized marine organisms applied to the design of biomimetic materials*”, Solid Mechanics @ Purdue Seminar series, **Purdue University**, July, 2010
8. “*Diseño de materiales estructurales de alta resistencia inspirados en organismos marinos*”, **Universidad del Valle**, Cali, Colombia, March 27, 2012.
9. “*Synergetic role of ultrastructure geometry and size scale in biomineralized and biomimetic materials*”, Bio-Interest Group (BIG) Seminars at Mechanical Science and Engineering (MechSE) Department, **University of Illinois at Urbana-Champaign (UIUC)**, April 9, 2012.
10. “*Multiscale computational modeling for bridging size scales in the failure of cementitious-based materials: Recent progress, current challenges, gaps and opportunities*”, As a Topic Leader at the **NSF US-Poland workshop on Multiscale Computational Modeling of Cementitious Materials (MCMoCM 2012)** Cracow, Poland, October 18-19, 2012
11. “*Mechanical investigation of naturally-occurring high performance materials*”, **Stanford University**, March 14, 2013.
12. “*Multiscale mechanics of natural fibers*”, **NSF Pan American Advanced Studies Institute (PASI)** on Polymer and Composite Materials from Renewable Resources and Biorefinery: from Chemistry to Applications, Costa Rica, August 2013,
13. *Mechanical Investigation of Biomineralized and Biologically-Inspired Materials: Lessons learned from Nature, I* **International Seminar on Biomaterials, Biomechanics and Regenerative Medicine**, RutaN, Medellin, Colombia, May 16, 2014.
14. *Mechanical Investigation of Biomineralized and Biologically-Inspired Materials: Lessons learned from Nature*, **EAFIT University**, Medellin, Colombia, May 19, 2014.
15. *Mechanical Investigation of Naturally-Occurring High Performance Materials: Lessons learned from Nature*, **Whistler Center for Carbohydrate Research, Purdue University**, May 30, 2014.
16. “*Numerical Investigation of Naturally-Occurring High Performance Materials*”, **XXI Congress on Numerical Methods and their Applications (ENIEF 2014)**, 23th-26th September 2014
17. “*Naturally-Occurring High Performance Materials: Lessons learned from Nature*”, **Biomimicry Group, Arizona State University**, March 26, 2015 (via teleconference)
18. *Bio-Inspired Materials: Lessons Learned from Nature*, Seminar series for **SURF Program, Purdue University**, June 18 2015. [Available on line- <https://nanohub.org/resources/22777>]
19. “*Investigación de la Mecánica de Materiales Compuestos Naturales y Biomiméticos de Alto Rendimiento*”, **Universidad Nacional de La Plata**, La Plata, Argentina, June 26, 2015.
20. “*Combined 3D Printing and Multi-scale Modeling for the Development of High Performance Biomimetic Materials*”, **American Concrete Institute (ACI) Headquarter**, Farnington Hills, Oct. 9, 2015.

21. “Nanocellulose-based Composites and Bio-inspired Materials”, **Smart Materials Workshop, Kent State University**, Kent, OH, April 13th, 2016.
22. “Designing Architected Materials” Seminar series for **SURF Program, Purdue University**, June 14 2016.
23. “Understanding the inner architecture of high-performance natural materials: a few interesting problems in mechanics”, **Jacobs School of Engineering, University of California San Diego**, San Diego, CA., Oct. 17, 2016.
24. “Engineering 2.0: Millions of years of trial and error making high-performance materials”, Featured Speaker, **Science on Tap Lafayette**, Oct. 27, 2016.
25. “Architected materials inspired by Nature: a few interesting problems in mechanics”, **William E. Boeing Department of Aeronautics & Astronautics, University of Washington**, Seattle, WA, Nov. 2, 2016.
26. “Engineering vs. Natural Materials”, **Grupo de Biotecnología Universidad de Antioquia**, Medellin Colombia (Via teleconference), Nov. 8, 2016.
27. “Architected materials inspired by Nature: a few interesting problems in mechanics”, **School of Engineering, Brown University**, Providence, RI, Nov. 21, 2016.

Intellectual property (IP):

U.S. and international patents awarded.

1. 7,448,678, Active material actuated headrest assemblies. Inventors: A. Browne, A. Chernoff, R. Glaser, N. Johnson, J. Khoury, U. Ukpai, P. Zavattieri. Assignee: GM Global Technology Operations, Inc. Issue Date: November 11, 2008.
2. 7,594,697, Active material actuated headrest assemblies. Inventors: A. Browne, A. Chernoff, R. Glaser, N. Johnson, J. Khoury, U. Ukpai, P. Zavattieri. Assignee: GM Global Technology Operations, Inc. Issue Date: September 29, 2009.
3. 7,758,121, Active material based conformable and reconfigurable seats. Inventors: A. Browne, N. Johnson, P. Zavattieri, U. Ukpai, J. Ulicny, J. Cafeo, R. Glaser, G. Jones; J. Khoury, C. Perelli, W. Rodgers, X. Gao, Assignee: GM Global Technology Operations, Inc. Issue Date: July 20, 2010.
4. 7,993,537, Method for improving adhesion between a shape memory alloy and a polymer. Inventors: L. Hector, Jr.A. Mance, W. Rodgers; P. Zavattieri, D. Okonski; E. Sherman, W. Barvosa-Carter. Assignee: GM Global Technology Operations LLC. Issue Date: August 9, 2011.
5. 8,190,331, Systems for detecting animate objects in a vehicle compartment. Inventors: A. Browne, N. Johnson; J. Khoury, A. Martin, P. Zavattieri, W. Barvosa-Carter, Assignee: GM Global Technology Operations LLC. Issue Date: May 29, 2012.
6. 8,388,773, Apparatus for and method of conditioning shape memory alloy wire. Inventors: J. Luntz, J. Shaw, D. Brei, C. Churchill, P. Anupam, N. Mankame, A. Browne,

- N. Johnson, P. Alexander, X. Gao, P. Zavattieri. Assignee: GM Technology Operations LLC. Issue Date: March 5, 2013.
7. 8,627,600, Full-Text Pinch protection mechanism utilizing active material actuation, X. Gao, C. Kollar, N. Johnson, A. Browne, P. Zavattieri; N. Mankame; P. Alexander. Assignee: GM Global Technology Operations LLC. Issue Date: January 14, 2014.
 8. 8,773,835, Active material actuation utilizing magnetic overload protection, N. Johnson, A. Browne, X. Gao, N. Mankame, P. Alexander, P. Zavattieri. Assignee: GM Global Technology Operations LLC. Issue Date: July 8, 2014.
 9. 8,870,144 Active material adaptive object holders, P. Zavattieri, M. Kramarcyk, A.L. Browne, J.Y. Khoury, N.L. Johnson, C. Namuduri, S.N. Karuppaswamy, N.D. Mankame, R.A. Glaser, P.W. Alexander, Assignee: GM Global Technology Operations LLC. Issue Date: October 28, 2014.
 10. 8,627,600, P. Zavattieri, N. Mankame, Bi-stable and multi-stable devices, Assignee: GM Global Technology Operations LLC. Issue Date: February 9, 2016

Published patent applications (source www.uspto.gov)

1. 20070246979, Active material actuated headrest assemblies. Inventors: A. Browne, A. Chernoff, R. Glaser, N. Johnson, J. Khoury, U. Ukpai, P. Zavattieri, Assignee: GM Global Technology Operations LLC. October 25, 2007
2. 20070246285, Active material based conformable and reconfigurable seats. Inventors: A. Browne, N. Johnson, P. Zavattieri, U. Ukpai, J. Ulicny, J. Cafeo, R. Glaser, G. Jones; J. Khoury, C. Perelli, W. Rodgers, X. Gao, Assignee: GM Global Technology Operations LLC. October 25, 2007
3. 20080023871, Methods of forming polymeric articles having continuous support structures. Inventors: D. Okonski, P. Zavattieri, Assignee: GM Global Technology Operations LLC. January 31, 2008
4. 20080103660, Systems for Detecting Animate Objects in a Vehicle Compartment. Inventors: A. Browne, N. Johnson; J. Khoury, A. Martin, P. Zavattieri, W. Barvosa-Carter, Assignee: GM Global Technology Operations LLC. May 1, 2008
5. 20080202637, Method for improving adhesion between a shape memory alloy and a polymer. Inventors: L. Hector, Jr. A. Rodgers; A. Mance, P. Zavattieri, D. Okonski; E. Sherman, W. Barvosa-Carter. Assignee: GM Global Technology Operations LLC. August 28, 2008
6. 20080222853, Shape memory alloy reinforced hoses and clamps. Inventors: P. Zavattieri, A. Gunther, Assignee: GM Global Technology Operations LLC. September 18, 2008
7. 20080272259, Active material adaptive object holders. Inventors: P. Zavattieri, M. Kramarcyk, A. Browne, J. Khoury, N. Johnson, C. Namuduri, S. Karuppaswamy, N. Mankame, R. Glaser, P. Alexander, Assignee: GM Global Technology Operations LLC. November 6, 2008
8. 20090008973, Active material actuated headrest assemblies. Inventors: A. Browne, A. Chernoff, R. Glaser, N. Johnson, J. Khoury, U. Ukpai, P. Zavattieri. Assignee: GM Global Technology Operations LLC, January 8, 2009
9. 20090223604, Apparatus for and method of conditioning shape memory alloy wires. Inventors: J. Luntz, J. Shaw, D. Brei, C. Churchill, P. Anupam, N. Mankame, A. Browne, N. Johnson, P. Alexander, X. Gao, P. Zavattieri, Assignee: GM Global Technology Operations LLC. September 10, 2009

10. 20100109322, Shape Memory Alloy Reinforced Hoses and Clamps. Inventors: P. Zavattieri, A. Gunther, N. Johnson, A. Browne, Assignee: GM Global Technology Operations LLC. May 6, 2010
11. 20100092238, Active material elements having reinforced structural connectors. Inventors: P. Zavattieri, X. Gao, W. Carter, E. Sherman, A. Browne, N. Johnson, P. Alexander, N. Mankame, W. Rodgers, R. Stevenson, J. Shoemaker, Assignee: GM Global Technology Operations LLC. April 15, 2010
12. 20110115114, Methods of forming polymeric articles having continuous support structures. Inventors: D. Okonski, P. Zavattieri, Assignee: GM Global Technology Operations LLC. May 19, 2011
13. 120110258931, Pinch Protection mechanism Utilizing Active Material Actuation. Inventors: X. Gao, C. Kollar, N. Johnson, A. Browne, P. Zavattieri, N. Mankame, P. Alexander, Assignee: GM Global Technology Operations LLC. October 27, 2011
14. 20130082427, Bi-Stable and Multi-Stable Devices. Inventors: P. Zavattieri, N. Mankame, Assignee: GM Global Technology Operations LLC. April 4, 2013
15. 20130242451, Active material actuation utilizing magnetic overload protection, Inventors: N. Johnson, A. Browne, X. Gao, N. Mankame, P. Alexander, P. Zavattieri, Assignee: GM Global Technology Operations LLC, September 19, 2013
16. 20160075601, Cellulose Nanocrystal additives and improved cementitious systems, J. Youngblood, P. Zavattieri, R. Moon, Y. Cao, Assignee: Purdue Research Foundation, March 17, 2016

List of NanoHUB tools published:

1. Kuo Tian, Mehdi Shishebor, P. Zavattieri "Coarse Graining of Crystalline Cellulose), doi:10.4231/D3930NW4D , <https://nanohub.org/resources/24763>
2. S Lee; C. Gomez, P. Zavattieri; A. Strachan (2011), "*Bio Composite Simulator*," DOI: 10254/nanohub-r12273.1. link: <http://nanohub.org/resources/nacresimulator>
3. Mateo Gómez Zuluaga; Robert J. Moon; Fernando Luis Dri; Pablo Daniel Zavattieri (2013), "Crystalline Cellulose - Atomistic Toolkit," DOI: 10.4231/D35T3G03B
Link: <https://nanohub.org/resources/ccamt>
4. Mateo Gómez Zuluaga; Fernando Luis Dri; Pablo Daniel Zavattieri; Robert J. Moon (2013), "Anisotropy Calculator - 3D Visualization Toolkit," DOI: 10.4231/D3K06X13R
Link: <https://nanohub.org/resources/matrix2surface>
5. F. Cordisco, Sk A S M Monirul Islam, D. Lemus, P. Zavattieri, "*NanoScale Adhesion Model Tool (Continuum)*", under development NanoHUB.
6. E. Ochoa, F. Dri, P. Zavattieri "*Nanoscale Adhesion Tool (Molecular Dynamics)*", NanoHUB (to be released in Summer 2013)

Appearances in media interviews and other coverage. (e.g., print, web, radio, television or other media coverage)

- Prof. Zavattieri's work on biological and biomimetic materials was featured in the Spring 2010 issue of the Engineering Impact magazine of the College of Engineering at Purdue University.
- Prof. Zavattieri's paper on **Nature Communications** [E.1.33] has been covered by the media:

- LiveScience article features Prof. Zavattieri's work on biomimetic materials "*Seashells Get Their Strength from Interlocking Bricks*"
- [LiveScience: <http://www.livescience.com/11696-seashells-strength-interlocking-bricks.html>]
- "*Seashells so tough they'll kick sand in your face*"
- [MSNBC Science :http://www.msnbc.msn.com/id/41378069/ns/technology_and_science-science/#.TxZF6pjtKs8 see image below]
- "*Synthetic materials that behave like mollusk shells*"
- [Purdue News: <http://www.purdue.edu/newsroom/pitn/2011/110204SyntheticMollusk.html>]
- [PhysOrg.com: <http://www.physorg.com/news/2011-02-synthetic-materials-mollusk-shells.html>]
- [Science Daily: <http://www.sciencedaily.com/releases/2011/02/110202162045.htm>]
- [EurekAlert!: http://www.eurekalert.org/pub_releases/2011-02/nu-smt020211.php]
- [Biomimicry: http://www.biomimicrynews.com/research/Synthetic_materials_that_behave_like_mollusk_shells.asp]
- "*Sólo Ciencia: Los Secretos del Nacar*"
- [Sólo Ciencia: <http://www.solociencia.com/quimica/11030404.htm>]
- "*Scientists Design Artificial Nanocomposites Using Nacre's Toughening Mechanism*"
- [Azonano: <http://www.azonano.com/news.aspx?newsID=21481>]
- More information can be found in: <https://engineering.purdue.edu/~zavattie/news.html>
- Press releases:
- "*Materials research focused on mantis shrimp*"
- [Purdue University Article: <https://engineering.purdue.edu/CE/AboutUs/News/Features/materials-research-based-on-mantis-shrimp>]
- "*Armored Caterpillar Could Inspire New Body Armor*"
- [ScienceDaily <http://www.sciencedaily.com/releases/2012/06/120607142355.htm>]
- "*How mantis shrimps deliver armour-shattering punches without breaking their fists*"
- [Discovery Magazine : <http://blogs.discovermagazine.com/notrocketscience/2012/06/07/how-mantis-shrimps-deliver-armour-shattering-punches-without-breaking-their-fists/#.UPwLQzm6h60>]
- "*Take that Thor! Secret of Hard-Hitting Crustacean Claw Found*"
- [Live Science Article: <http://www.livescience.com/20811-hard-hitting-crustacean-claw-engineering.html>]
- "*Hulk take break, Shrimp Smash!*"
- [Scientific American: <http://www.scientificamerican.com/podcast/episode.cfm?id=hulk-take-break-shrimp-smash-12-06-07>]
- "*Crustacean's claw may be suited for battle*"
- [Los Angeles Times: <http://articles.latimes.com/2012/jun/08/science/la-sci-0609-strong-shrimp-claws-20120609>]
- "*A colorful crustacean with a knockout punch*"
- [New York Times: http://www.nytimes.com/2012/06/12/science/peacock-mantis-shrimp-has-a-knockout-punch.html?_r=2&]
- "*Bam! How a shrimp's 200-lb punch could lead to better football helmets*" [Alaska Dispatch: <http://www.alaskadispatch.com/article/bam-how-shrimps-200-lb-punch-could-lead-better-football-helmets>]
- Prof. Zavattieri's research on biological and biomimetic materials was highlighted in **Purdue Today**, *CE Impact Magazine* and others.
- Purdue Today: <http://www.purdue.edu/newsroom/purduetoday/releases/2013/Q2/purdue-civil-engineers-increasingly-look-to-nature-to-improve-material-performance.html>
- CE Impact Magazine: <https://engineering.purdue.edu/CE/AboutUs/News/ImpactCE/CE-Impact-Spring-2013.pdf>

- additional reading: <http://willisrconner.wordpress.com/tag/pablo-zavattieri/>
 - An article on Prof. Zavattieri general area of research has been published in Materials Design Magazine. "**Smart Materials Stem From Nature**" <http://machinedesign.com/materials/smart-materials-stem-nature>
 - CNC Cellulose work published in the journal Cellulose [3.1.38] has been covered by the media and Purdue News.
 - Press release:
 - *Cellulose nanocrystals possible 'green' wonder material* [Purdue University News Article: <http://www.purdue.edu/newsroom/releases/2013/Q4/cellulose-nanocrystals-possible-green-wonder-material.html>]
 - *New look at old structure for future possibilities* [Green career: <http://www.greencareer.net.au/news/new-look-at-old-structure-for-future-possibilities>]
 - *Cellulose nanocrystals possible 'green' wonder material* [Daily News: <http://dailynewsen.com/2013/12/16/cellulose-nanocrystals-possible-green-wonder-material.html>]
 - *Cellulose nanocrystals possible 'green' wonder material* [ScienceDaily: <http://www.sciencedaily.com/releases/2013/12/131216155040.htm>]
 - *Cellulose nanocrystals possible 'green' wonder material* [PhysOrg: <http://phys.org/news/2013-12-cellulose-nanocrystals-green-material.html>]
 - **SES Conference returns to Purdue after 51 years.** Prof. Zavattieri was the conference main organizer and secretary: <http://www.purdue.edu/newsroom/releases/2014/Q3/conference-returns-to-purdue-after-51-years.html>
 - <http://www.insideindianabusiness.com/newsitem.asp?id=66890>
 - **Mantis shrimp stronger than airplanes: Composite material inspired by shrimp stronger than standard used in airplane frames:** <http://www.sciencedaily.com/releases/2014/04/140422130944.htm>
 - <http://www.iflscience.com/technology/mantis-shrimp-inspired-material-stronger-airplanes>
 - <http://ucrtoday.ucr.edu/21670>
 - **Mantis Shrimp, Toucan and Trilobite, Oh My:** <http://ucrtoday.ucr.edu/21729>
 - **Research team awarded \$7.5 million Department of Defense award:** <https://engineering.purdue.edu/CE/AboutUs/News/Features/research-team-awarded-75-million-department-of-defense-award>
 - **Collaboration with EAFIT University (Colombia):** <http://www.eafit.edu.co/agencia-noticias/historico-noticias/2014/noticias-noviembre/Paginas/investigacion-eafit-y-purdue-investigan-materiales-resistentes-inspirados-en-la-naturaleza.aspx>
 - **Purdue to collaborate with Argentine Republic:** <http://www.purdue.edu/newsroom/releases/2014/Q4/purdue-to-collaborate-with-argentine-republic.html>
 - <http://www.mincyt.gob.ar/noticias/baranao-firmo-acuerdos-con-las-universidades-purdue-y-de-chicago-10595>
 - **Creative Young Engineers Selected to Participate in NAE's 2014 U.S. Frontiers of Engineering Symposium** <http://www.naefrontiers.org/Media/PressReleases16984/45548.aspx>
 - **Particle That Makes Plants Strong and Light Could Find Way into Man-Made Materials,** Technology section of March 2014 issue of Civil Engineering, The magazine of the American Society of Civil Engineering (ASCE). <http://www.asce.org/cemagazine/>
 - **Inspired by Nature,** Civil Engineering **IMPACT** Magazine, Purdue University, Fall 2014.
 - **Innovative energy-absorbing materials have potential uses in buildings, helmets,** <http://www.purdue.edu/newsroom/releases/2015/Q4/innovative-energy-absorbing-materials-have-potential-uses-in-buildings,-helmets.html>
- (Phys.org) <http://phys.org/news/2015-11-energy-absorbing-materials-potential-helmets.html>

Grants and contracts.

Prof. Pablo Zavattieri secured funding for over 27 proposals related to advanced, architected and biological materials for more than \$15 million of total funding from federal (NSF, DoD, USFS, FAA), state (INDOT), university (School, PRF,NCN) and private (GM, Velcro, P3Nano) sources, in which \$4 million has been attributed to him. He has received 6 NSF awards. Four are currently active, including his NSF CAREER. His funding also includes several DoD awards including a \$7.5M DoD MURI award (in which \$1M is attributed to him).

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1. Agency/Title of Grant: **General Motors Science Lab Technical Council (GM-STLC) Discovery Project: “Design of Bio-Inspired Strong Materials with Added Functionality”**
 2. Duration of Funding: **Three (3) years (2007-2009)**
 3. Total amount of award: **\$500,000**
 4. Your role: **PI (%100)** To work on the design of novel biomimetic materials, computational modeling and to establish collaboration with universities to work on the processing and experimental part.
 5. Co-investigators: **NA**

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1. Agency/Title of Grant: **University of California/State of California – Discovery Grant “Bio-Mimetic/Inspired Approach to Nacre-like Materials”**
 2. Duration of Funding: **Three (3) years (2008-2010)**
 3. Total amount of award **\$135,900**
 4. Your role and amount for which you are directly responsible: **Co-PI** (as employee of GM, no salary was requested for Dr. Zavattieri. However, Dr. Zavattieri had leadership over the computational and mechanical modeling tasks. In addition, Dr. Zavattieri advised a graduate student and one post-doctoral researcher). **Responsibilities:** Lead the modeling and mechanics-related efforts of the project.
 5. Co-investigators: **Prof. David Kisailus**, (Univ. of California – Riverside) .

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1. Agency/Title of Grant: **AFOSR – “Biologically Inspired Synthesis and Structure-Function Analysis of High Performance Composites”**
 2. Duration of Funding: **Three (3) years (2009-2012)**
 3. Total amount of award **\$481,242**
 4. Your role and amount for which you are directly responsible: **Co-PI** (as employee of GM, no salary was requested for Dr. Zavattieri. However, Dr. Zavattieri had leadership over the computational and mechanical modeling tasks. In addition, Dr. Zavattieri advised a graduate student and one post-doctoral researcher). **Responsibilities:** Lead the modeling and mechanics-related efforts of the project. Also develop a new methodology to fabricate bioinspired materials using 3D printing (rapid prototyping).
 5. Co-investigators: **Prof. David Kisailus** (Univ. of California, Riverside) .

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1. Agency/Title of Grant: **INDOT/JTRP: “Removing Obstacles for Pavement Cost Reduction by Examining Early Age Opening Requirements”**
 2. Duration of Funding (Dates): **3 years (2010-2012) with a NCE (2013)**
 3. Total amount of award: **\$250,000.00**
 4. Your role and amount for which you are directly responsible: **Co-PI** (support for one student). **Responsibilities:** Develop a non-linear fracture mechanics approach to predict and characterize the fracture behavior of concrete at early ages.
 5. Co-investigators: **Jason Weiss** (CE, Purdue) **and Tommy Nantung** (INDOT)

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1. Agency/Title of Grant: **Purdue Research Foundation: Computational multiscale modeling of hierarchical materials**
 2. Duration of Funding (Dates): **1 year (06/2010-06/2011)**

3. Total amount of award: **\$16,795**
4. Your role and amount for which you are directly responsible: **PI (%100)**
5. Co-investigators: **NA**

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1. Agency/Title of Grant: **General Motors: “Preliminary investigation of active materials based micro-scale compliant mechanisms”**
 2. Duration of Funding (Dates): **6 months (6/2010-12/2010)**
 3. Total amount of award: **\$4,800.00**
 4. Your role and amount for which you are directly responsible: **PI (%100)**
 5. Co-investigators: **NA**

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1. Agency/Title of Grant: **Network for Computational Nanotechnology (CNC): “Deployment of a cyber-enabled computational tool for the accurate characterization of adhesion in low-dimensional nanostructures”**
 2. Duration of Funding (Dates): **1 year (9/2010-8/2011)**
 3. Total amount of award: **Support for 1 grad student**
 4. Your role and amount for which you are directly responsible: **PI (100%)**
 5. Co-investigators: **NA**

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1. Agency/Title of Grant: **General Motors: “Study of patterned interfaces”**
 2. Duration of Funding (Dates): **N/A (Gift)**
 3. Total amount of award: **\$50,000.00**
 4. Your role and amount for which you are directly responsible: **PI (%100)**
 5. Co-investigators: **NA**

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1. Agency/Title of Grant: **General Motors Research and Development: “A Computational Study of the Dynamic Response of Shape Memory Polymer- based Variable Geometry Cellular Materials”**
 2. Duration of Funding (Dates): **6 months (1/2011-12/2011)**
 3. Total amount of award: **\$22,095.00**
 4. Your role and amount for which you are directly responsible: **PI (%100)**
 5. Co-investigators: **NA**

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1. Agency/Title of Grant: **U.S. Forest Service: “Engineering Cellulose Based Structures for Advanced Composites”**
 2. Duration of Funding (Dates): **4 years (8/2011-7/2015)**
 3. Total amount of award: **\$300,000.00**
 4. Your role and amount for which you are directly responsible: **co-PI (\$55,318.67). Responsibilities:** Lead the computational and mechanics-related efforts.
 5. Co-investigators: **Jeffrey Youngblood (MSE, Purdue), Carlos Martinez (MSE, Purdue), Robert Moon (US Forest Service, FPL)**

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1. Agency/Title of Grant: **U.S. Forest Service: “Multiscale Modeling of the Hierarchical Structure of Cellulose nanocrystalline Materials”.**
 2. Duration of Funding (Dates): **1year (6/2011-9/2012)**
 3. Total amount of award: **\$12,425.00**
 4. Your role and amount for which you are directly responsible: **PI (%100)**
 5. Co-investigators: **Robert Moon (US Forest Service, FPL)**

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1. Agency/Title of Grant: **National Science Foundation (CMMI-Structural materials and Mechanics): “High Performance Cement Composites with Nanocrystalline and Nanofibrillated Cellulose”.**

2. Duration of Funding (Dates): **3 year (8/2011-7/2014)**
3. Total amount of award: **\$350,000.00**
4. Your role and amount for which you are directly responsible: **PI**: To lead the project, guide the two students working on the project. Collaborate with JW and JY on the processing side, and lead the modeling efforts.
5. Co-investigators: **Jason Weiss** (CE, Purdue), **Jeffrey Youngblood** (MSE, Purdue), **Robert Moon** (US Forest Service, FPL)

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1. Agency/Title of Grant: **DoD-AFOSR: “Damage-tolerant Biological Composites Derived from the Teeth of a Giant Chiton”**. (Sub-award from UC-Riverside)
 2. Duration of Funding (Dates): **5 year (1/2012-12/2016)**
 3. Total amount of award: **\$750,000.00 (Total)**
 4. Your role and amount for which you are directly responsible: **co-PI** (\$274,734.00). **Responsibilities**: Lead the numerical modeling efforts, and some of the micromechanical insitu-ESEM experiments
 5. Co-investigators: **David Kisailus** (University of California, Riverside)

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1. Agency/Title of Grant: **GM Discovery Project: “Multifunctional cellular materials with programmable properties”**
 2. Duration of Funding (Dates): **2 year (3/2012-3/2014)**
 3. Total amount of award: **\$400,000.00**
 4. Your role and amount for which you are directly responsible: **PI**. **Responsibilities**: Lead the overall project numerical modeling efforts, and some of the micromechanical experiments. Additional responsibilities: Development of numerical methodologies, computational analysis, prototyping and mechanical testing. (\$200,000)
 5. Co-investigators: **Douglas Adams** (ME, Purdue)

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1. Agency/Title of Grant: **AFOSR: “Uncovering and Validating Toughening Mechanisms in High Performance Composites”**. (Sub-award from UC-Riverside)
 2. Duration of Funding (Dates): **5 year (5/2012-5/2016)**
 3. Total amount of award: **\$590,000 (total)**
 4. Your role and amount for which you are directly responsible: **co-PI** (\$245,326). **Responsibilities**: Lead the numerical modeling efforts, and some of the micromechanical insitu-ESEM experiments
 5. Co-investigators: **David Kisailus** (University of California, Riverside)

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1. Agency/Title of Grant: **DoD-AFOSR (DEFENSE UNIVERSITY RESEARCH INSTRUMENTATION PROGRAM (DURIP)): A multi-material 3D Printer**
 2. Duration of Funding (Dates): Awarded in 2012 to purchase the multi-material 3D printer.
 3. Total amount of award: **\$237,325**
 4. Your role and amount for which you are directly responsible: **co-PI** (\$47312.40)
 5. Co-investigators: T. Siegmund (ME), J.S. Bolton (ME), R. J. Cipra (ME), K. Ramani (ME).

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1. Agency/Title of Grant: **U.S. Forest Service: “Development And Validation Of A Mesoscale Model For Cellulose Nanocrystals”**.
 2. Duration of Funding (Dates): **1 year (10/2012-9/2013)**
 3. Total amount of award: **\$12,278.00**
 4. Your role and amount for which you are directly responsible: **PI (%100)**
 5. Co-investigators: **Robert Moon** (US Forest Service, FPL)

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1. Agency/Title of Grant: **INDOT/JTRP: “Toward Performance Related Specifications for Concrete Pavements”**
 2. Duration of Funding (Dates): **3 years (2013-2015)**
 3. Total amount of award: **\$350,000.00**

4. Your role and amount for which you are directly responsible: **Co-PI (\$115,500)**
5. Co-investigators: **Jason Weiss** (CE, Purdue), **Fred Mannering** (CE, Purdue) and **Tommy Nantung** (INDOT)

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1. Agency/Title of Grant: **ARO-DOD: “Damage-tolerant Biological Composites Derived from the teeth of a Giant Chiton”**. (*Sub-award from UC-Riverside*)
 2. Duration of Funding (Dates): **2year (1/2013-12/2014)**
 3. Total amount of award:
 4. Your role and amount for which you are directly responsible: **co-PI (\$15,000)**. **Responsibilities:** L numerical modeling efforts, and some of the micromechanical insitu-ESEM experiments
 5. Co-investigators: **David Kisailus** (University of California, Riverside)

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1. Agency/Title of Grant: **DoD/IllinoisRocstar LLC: “Field Assessment of Materials for Use in Ultra-High Performance Concrete”**
 2. Duration of Funding (Dates): **9 months (4/2013-12/2013)**
 3. Total amount of award: **\$65,000.00**
 4. Your role and amount for which you are directly responsible: **Co-PI (\$32,500)**
 5. Co-investigators: **Jason Weiss** (CE, Purdue)

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1. Agency/Title of Grant: **NSF Faculty Early Career Development (CAREER), Title: “Multiscale Investigation and Mimicry of Naturally-Occurring Ultra-High Performance Composite Materials”. Structural Materials and Mechanics (SMM) and Mechanics of Materials (MoM) (ENG directorate, CMMI Division)**
 2. Duration of Funding (Dates): **5 years (7/2013-6/2018)**
 3. Total amount of award: **\$400,000.00**
 4. Your role and amount for which you are directly responsible: **PI (100%)**
 5. Co-investigators: **none**

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1. Agency/Title of Grant: **Velcro Company “A multiscale strategy for the modeling of the mechanical performance of hoop and loop fasteners based on a Detachment Zone Model (DZM)”**
 2. Duration of Funding (Dates): **1years (7/2013-6/2014)**
 3. Total amount of award: **\$100,000.00**
 4. Your role and amount for which you are directly responsible: **PI (100%)**
 5. Co-investigators: **none**

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1. Agency/Title of Grant: **DoD/MURI (AFOSR) Convergent Evolution To Engineering: Multiscale Structures And Mechanics In Damage Tolerant Functional Bio-Composite And Biomimetic Materials**
 2. Duration of Funding (Dates): **5years (10/2014-10/2017)**
 3. Total amount of award: **\$7,500,000.00**
 4. Your role and amount for which you are directly responsible: **PI (\$1,050,000.00)**
 5. Co-investigators: **none**

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1. Agency/Title of Grant: **INDOT/JTRP: Investigating The Need For Hma Drainage Layers**
 2. Duration of Funding (Dates): **2 years (04/2014-03/2016)**
 3. Total amount of award:
 4. Your role and amount for which you are directly responsible: **PI (\$52,000)**
 5. Co-investigators: **John Haddock**
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1. Agency/Title of Grant: **NSF Scalable NanoManufacturing. SNM: Roll-To-Roll Manufacturing Of Films And Laminates Based On Cellulose Nanomaterials**
2. Duration of Funding (Dates): **4 years (11/2014-10/2018)**
3. Total amount of award: **\$1,477,970.00**
4. Your role and amount for which you are directly responsible: **co-PI (\$369492.5)**
5. Co-investigators: **Jeff Youngblood (MSE), Alex Wei (ChE), George Chiu (ME)**

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1. Agency/Title of Grant: **P3 Nano: Developing Approaches To Use Of Cellulose Nanocrystals (CNC) On A Commercial Scale As A Sustainable Value Material For Portland Cement And Concrete**
 2. Duration of Funding (Dates): **5years (10/2014-10/2017)**
 3. Total amount of award:
 4. Your role and amount for which you are directly responsible: **co-PI (115436.31)**
 5. Co-investigators: **Jason Weiss, Jeff Youngblood (MSE)**

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1. Agency/Title of Grant: **FAA: Project No. 1: Heated Airport Pavements**
 2. Duration of Funding (Dates): **3years (9/2013-7/2016)**
 3. Total amount of award: **\$**
 4. Your role and amount for which you are directly responsible: **co-PI (\$42,412.69)**
 5. Co-investigators: **Jason Weiss, K. Erk (MSE), B. Tao (ABE)**

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1. Agency/Title of Grant: **NSF: A Proposal For Partial Support Of Organizing The 51St Ses Annual Technical Meeting (MoM)**
 2. Duration of Funding (Dates): **1 year (9/2014-8/2015)**
 3. Total amount of award: **\$ 15,000**
 4. Your role and amount for which you are directly responsible: **PI (\$15,000)**
 5. Co-investigators: **Anil Bajaj (ME)**

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1. Agency/Title of Grant: **INDOT/JTRP: Concrete Patching Materials And Techniques An Guidelines For Hot Weather Concreting (SPR-3905)**
 2. Duration of Funding (Dates): **2 years (12/2014-12/2016)**
 3. Total amount of award:
 4. Your role and amount for which you are directly responsible: **co-PI (\$79,200)**
 5. Co-investigators: **Jason Weiss**

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1. Agency/Title of Grant: **Velcro Company: A Multiscale Strategy For The Modeling Of The Mechanical Performance Of Hoop And Loop Fasteners Based On A Detachment Zone Model (Dzm). Stage II: ... Improvement Of A High Fidelity Micromechanical Model**
 2. Duration of Funding (Dates): **1 years (7/2014-6/2015)**
 3. Total amount of award: **\$100,000**
 4. Your role and amount for which you are directly responsible: **PI (100%)**
 5. Co-investigators:

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1. Agency/Title of Grant: **GOALI: Phase Transforming Cellular Materials**
 2. Duration of Funding (Dates): **3years (2015-2018)**
 3. Total amount of award: **\$343,296**
 4. Your role and amount for which you are directly responsible: **PI (\$343,296)**
 5. Co-investigators: **Collaborator at GM, Nilesh Mankame**
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2. Agency/Title of Grant: **Velcro Company: A Multiscale Strategy For The Modeling Of The Mechanical Performance Of Hoop And Loop Fasteners Based On A Detachment Zone Model (Dzm). Stage III: .Development of new loop generator, numerical and experimental investigation**
2. Duration of Funding (Dates): **1 years (1/2015-1/2016)**
3. Total amount of award: **\$60,000**
4. Your role and amount for which you are directly responsible: **PI (100%)**
5. Co-investigators:

Grant Activity

1. Agency/Title of Grant: **USDA (CRADA Program) Yreka Project: Reinforcing Cement**
 2. Duration of Funding (Dates): **3 years (08/16/2016 - 08/15/2019)**
 3. Total amount of award: **\$100,000**
 4. Your role and amount for which you are directly responsible: **PI (33%)**
 5. Co-investigators: **Jeff Youngblood (MSE), Jason Weiss (Oregon State)**
- Status: PIs and funding agency agreed to proceed (currently working on paperwork)**

Grant Activity

Agency/Title of Grant: **NSF: Collaborative Research: 3D Printing of Civil Infrastructure Material with Controlled Microstructural Architectures (CMMI - Materials Eng. & Processing)**

1. Duration of Funding (Dates): **3 years (2016-2019)**
 3. Total amount of award: **\$206,000 + cost share from CoE**
 4. Your role and amount for which you are directly responsible: **PI (33%)**
 5. Co-investigators: **Jan Olek (CE), Jeff Youngblood (MSE)**
- Note: This will support 1 PhD for 2 years.

Grant Activity

1. Agency/Title of Grant: **Lvles School of Civil Engineering**
 2. Duration of Funding (Dates): **1 year (2016-2017)**
 3. Total amount of award: **\$22,200**
 4. Your role and amount for which you are directly responsible: **PI (33%)**
 5. Co-investigators: **Jan Olek (CE), Jeff Youngblood (MSE)**
- Note: This will support 1 PhD for 1 years or 1 postdoc for ~6 months.

Grants with International Organizations:

Colciencias (Colombia) *“Diseño y fabricación de topografías controladas por micromecanizado para sockets de prótesis para amputados transfemorales: evaluación de influencia en distribución de esfuerzos y relación con el confort”*

Date: 5/30/2012

Requested Funds: (Student support to work at Universidad de Antioquia-UdeA, Colombia, and travel support)

Your role: co-PI and consultant

Collaborators: J.J.Pavón Palacio (Inv. Principal), co-PIs J. Villarraga, J.F. Ramirez, A. Toro, J. Bris Cabrera.

Teaching:

Prof. Pablo Zavattieri graduated 5 PhD and 2 MS students, and he is currently supervising 11 PhD, 3 MS students and 6 undergraduate students; many of them recipients of University and CE awards (including the best dissertation and several SURF Awards of Excellence). He has a strong record of mentoring undergraduate students (taking advantages of programs such as SURF, Honors, and individual studies). He teaches both undergraduate and graduate courses including Advanced Solid Mechanics, Computational Mechanics, Numerical methods and Nonlinear Fracture Mechanics in the School of Civil Engineering. Zavattieri teaches CE231 “Materials Engineering I” regularly. He is an IM:PACT fellow and his CE231 evaluation has been increasing since he participated in the program. He has been improving the student learning experience in CE231 since then by adding elements of active learning in the classroom.

CE231 “*Engineering Materials I*”, **Purdue University**, West Lafayette, IN. (Taught in Fall 2009, Fall 2010, Fall 2011, Fall 2012, Spring 2013, Fall 2013, Spring 2014, Spring 2015, Spring 2016).

CE597 “*Advanced Topics in Classical and Computational Solid Mechanics*”, **Purdue University**, West Lafayette, IN. (Taught in Spring 09, Spring 12, Fall 2014).

Web site: <http://engineering.purdue.edu/~zavattie/CE597>

CE597 “*Nonlinear Fracture Mechanics*”, **Purdue University**, West Lafayette, IN. (Taught in Spring 11, Spring 13, Fall 2015), Web site: <http://engineering.purdue.edu/~zavattie/Fracture/>.

ME323 “*Mechanics of Materials*”, School of Mechanical Engineering, **Purdue University**, West Lafayette, IN. (Taught in Spring 2009)

ME581 “*Numerical Methods in Mechanical Engineering*”, School of Mechanical Engineering, **Purdue University**, West Lafayette, IN. (Taught in Fall 08).

“*The Finite Element Method: Theory and Implementation*” (Course designed by Zavattieri and taught at the graduate level), Department of Aeronautical Engineering, **Universidad Nacional de la Plata**, La Plata, Argentina. (Taught in 2001)

Current Students:

Graduate Students:

1. Isaias Gallana, Ph.D. Student, Research Topic: *Bioinspired/smart composite materials*
2. Nobphadon Suksangpanya, Ph.D. Candidate (1/2012-present), Topic: *Modeling and Mechanics of biological and biomimetic impact tolerant materials*
3. Federico Antico, Ph.D. Candidate (1/2010-present). Research Topic: *Numerical Multiscale Strategies for Modeling Failure of Heterogeneous Materials*. (Research in absentia)
4. Nicolas Guarin, Ph.D. Student (1/2013-present), Topic: *Modeling of the dynamic behavior of naturally-occurring ultra-high performance composite materials*.

5. Mehdi Shishehbor, Ph.D. Student (1/2013-present) Topic: *Modeling of Cellulose NanoCrystals (CNCs)*
6. Yunlan Zhang, Ph.D. Student (08/2014-present), Topic: *Bioinspired Cellular Materials*
7. Di Wang, Ph.D. Student (08/2014-present), Topic: *Bioinspired bouligand structures*
8. Maryam Sadat Hosseini, Ph.D. Student (01/2014-present), Topic: *Modeling of naturally-occurring armor plates*
9. Vanessa Restrepo, MS Student (07/2013-present), Topic: *A multiscale modeling approach for hook and loop interfaces*
10. Hadi Shagerdi Esmaeli, MS Student (08/2012-present), Topic: *Multiscale strategies for the modeling of damage in cementitious materials*
11. Chanhue Jeong, MS Student (08/2014-present), Topic: *Naturally occurring and biomimetic rod-like microstructures*
12. Adwaitarun Trikanad, MS Student (08/2015-present), Topic: *Dynamic analysis of impact resistant structures*
13. Luz Maria Agudelo Urrego, MS Student (08/2016-present), Topic: *phase transforming metamaterial with snapthrough instabilities for energy absorption applications*

Post-docs:

1. David Restrepo, Ph.D. “*Mechanics of high-performance impact resistant materials*”

Completed PhD:

1. Fernando Dri, Ph.D., “*Multiscale Modeling of the Hierarchical Structure of Cellulose Nanocrystals*”. Purdue University, Dec 2013. (Currently at Dassault Systèmes SIMULIA Vélizy-Villacoublay, France).
2. Fernando Cordisco, Ph.D., “*Geometry and length scale selection in patterned interfaces with application to materials design*”, Purdue University, Jan 2014. (Currently at Dassault Systèmes SIMULIA Great Lakes, Michigan, USA).
3. Yizheng Cao PhD, co-advised with Jeffrey Youngblood (MSE) Jason Weiss (CE), “*Nano-modification for high performance cement composites with cellulose nanocrystals and carbon nanotubes*”, Purdue University, July 2014
4. Enrique Escobar de Obaldia, PhD, “*Unveiling the mechanical properties of the mature radular tooth of the C. Stelleri*”, Purdue University, January 2015. (Currently: Project Manager, Simufact Engineering, GMBH, Hamburg, Germany)
5. David Restrepo, Ph.D. “*Programmable materials based on cellular solids*”, Purdue University, Nov. 2015. (Currently: post-doc in Zavattieri’s group).

Completed MS:

1. Hadi Shagerdi Esmaeeli, MS, “*Numerical simulation of freeze-thaw behavior and fracture behavior of cementitious systems*”, Aug. 2015. (Currently PhD Student in Zavattieri’s group)
2. Vanessa Restrepo, MS, Topic: “*A multiscale modeling approach for hook and loop interfaces*”, April. 2016.

Past visiting students and scholars:

1. Nadia N Aljabi, Spring 2016 and SURF Student (Summer 2015),
2. Michael Jones, SURF Student, Summer 2014, Fall 2014, Spring 2015
3. Chanhue Jeong, Fall 2012, Spring 2013, Honor Student, SURF Student
4. Pornphubeth P Mettaprasert, CE Undergraduate Student, Fall 2014
5. Chaoyi Zhang, CE Undergraduate Student, Honors Student Spring 2013
6. Eic Leekr, IE Undergraduate Student, Summer/Fall 2013
7. Ashwin Nair, CE Graduate Student, Fall 2012
8. Qianqian Wang, Ph.D. visiting student (Summer, 2010),
9. David Restrepo, visiting student (8/2010-6/2011).
10. Francisco Javier Velez Hoyos, Ph.D. Student, (8/2010-present),
11. Jose Fernando Rave Arango, Internship student from School of Engineering of Antioquia, Medellin, Colombia (March-July 2011).
12. Diego Useche-Reyes, NCN-NanoHUB - SURF Student, Summer 2012,
13. Sk A S M Monirul Islam, NCN-NanoHUB - SURF Student, Summer 2011,
14. Daniel Alberto Lemus, NCN-NanoHUB - SURF Student, Summer 2011.
15. Carlos Gomez, NCN-NanoHUB - SURF program (Summer 2010)
16. Sebastian Juan Tong Lee, NCN-NanoHUB - SURF program (Summer 2010)
17. Ajinkya Shirude, ME undergraduate student (Fall 2010).
18. Shriram Siravara, ME graduate student (Spring 2010).
19. Gautam Naik, ME graduate student, Spring 2009.

Visiting Faculty:

Dr. Juan David Gomez C., Professor at EAFIT University, Medellin, Colombia. (Jan. - Feb. 2011).

Student Awards:

Students who received awards for their work done under the supervision of Prof. Zavattieri

1. Carlos Gomez, *Award of Excellence - Top Research Talk*, SURF Research Symposium, Purdue University, 2010.
2. Federico Antico, *William and Mary Goetz Graduate Scholarship*, School of Civil Engineering, Purdue University, 2011.
3. Fernando Dri, *William L. Dolch Graduate Scholarship*, School of Civil Engineering, Purdue University, 2012.

4. Purdue University *Award of Excellence - Top Research Poster*, SURF Research Symposium, Purdue University, 2012.
5. Fernando Dri, *Certificate of Excellence*, Office of Interdisciplinary Graduate Program (OIGP), Purdue University, 2012.
6. Enrique Escobar de Obaldia, *Nellie Munson Teaching Assistant Award*, School of Civil Engineering, Purdue University, 2013.
7. Chan Jeong, *Cementitious Materials Research Award*, School of Civil Engineering, Purdue University, 2013.
8. Chanhue Jeong, *Award of Excellence – Top Research Poster* at the SURF Research Symposium, Purdue University, 2013.
9. Fernando Dri, *Fall 2013 CE Best Dissertation Award*. School of Civil Engineering, Purdue University, 2013.
10. David Restrepo, *William and Mary Goetz Graduate Scholarship*, Lyles School of Civil Engineering, Purdue University, 2014.
11. Nobphadon Suksangpanya *2015 William L. Dolch Graduate Scholarship*. Lyles School of Civil Engineering, Purdue University, 2015.
12. David Restrepo, *Fall 2015 CE Best Dissertation Award*. Lyles School of Civil Engineering, Purdue University, 2015.
13. John Cleveland, *Award of Excellence - Top Research Talk*, SURF Research Symposium, Purdue University, 2016.
14. Hadi Shagerdi esmaeeli, *Nellie Munson Teaching Assistant Award*, School of Civil Engineering, Purdue University, 2016.
15. Nicolas Guarin-Zapata, *2065 William L. Dolch Graduate Scholarship*. Lyles School of Civil Engineering, Purdue University, 2016
16. Nobphadon Suksangpanya, *Fall 2016 CE Best Dissertation Award*. Lyles School of Civil Engineering, Purdue University, 2016.

Service and Professional Activities

Zavattieri has been very active in the Solid Mechanics and Materials Community. He has been a reviewer of over 40 journals, served in several NSF panels and reviewed proposals for international research foundations. Prof. Zavattieri is an active member of the ASME, MRS, SES, SHPE and SEM. He is the current chair of the Biological Systems and Materials Technical Division of the Society of Experimental Mechanics (SEM). Prof. Zavattieri has also been involved in the Society of Hispanic Professional Engineers (SHPE) since 2011. He has been a key player in the academic program of the national conference and he has been recently appointed as the chair of the SHPE Engineering Science Symposium, a unique undergraduate and graduate mentoring experience. He is currently the chair of the 2016 SHPE (Society of Hispanic Professional Engineers) Engineering Science Symposium. He was also the main organizer, proponent and conference secretary of the prestigious 51st Society of Engineering Science (SES) Annual Technical meeting that took place in Purdue University on Oct. 1-3, 2014. He currently serves in the editorial board of two international journals, and edited 5

conference proceedings. He also served as guest editor of a special issue for an international journal.

Memberships in academic, professional and scholarly societies.

1. 2001-2005 Member of the Automotive Composites Consortium (ACC), **United State Council for Automotive Research** (USCAR). Sub-committee: Crash Analysis of Adhesive Bonded Composite Structures (CAABS).
2. 2001-2009 Member of the General Motors/Brown University Collaborative Research Laboratory on Computational Materials Research.
http://www.engin.brown.edu/facilities/GM_CRL/
3. 2003-2004 appointed member of the Committee of Technical and Educational Programs (CTEP) of the General Motors Research and Development Center.
4. 2003-Present: Member of the American Society of Mechanical Engineers (ASME).
5. 2009-2010, 2013-Present: Member of the Materials Research Society (MRS).
6. 2010-Present: Active member of the Society of Experimental Mechanics (SEM). Active Role: *Biological Systems and Materials* Technical Division of the Society of Experimental Mechanics (SEM) *Secretary* 2012-2014, *Co-Chair* 2014-Present.
7. 2010-Present: Active Member of the Society of Hispanic Professional Engineers (SHPE).
Active Role: Chair of the 2012, 2013, 2014, 2015 SHPE Undergraduate and Graduate Student Scientific Paper Presentations.
8. 2011-Present: Member of the Society of Engineering Sciences (SES).

Major committee assignments in the Department, School, and/or University.

College of Engineering level

1. Served as a Member of the College of Engineering **Strategic Planning Team 8b: “Global Engagement”** (Aug.-Nov. 2009). *Attended weekly meetings and worked with other members to write the final report that was presented to the Dean in November 2009.*
2. Serving as a faculty mentor of the student Andrew Norbert Martin, one of *2010 Beering Scholars*.
3. Member of the **Colombia Purdue Institute of Advanced Scientific Research (CPIASR)** special committee on “*Engineering against Natural Hazards*” to visit 8 top Colombian universities the week of March 12th-16th, 2012. This trip took place during the Spring Break 2012 (March 18-23th), and the group visited 9 universities in the cities of Medellin, Cali and Bogota.
4. *2013-Present:* Faculty member of the Dean’s Engineering Advisory Council, College of Engineering.

School level

5. CE Honors Committee since June 2010
6. Materials Area Search Committee, 2014, 2015.
7. Served as a member of the Curtis Professorship committee in Aug. 2010.
8. CE Graduate Committee Meetings, Sept. 2015.

Administrative duties at Purdue.

Dec. 2009-Present, **Materials Engineering Area Coordinator**, School of Civil Engineering. As such Prof. Zavattieri is responsible for the teaching assignments and TAs in the Area of Materials and to serve as a communication link between the School administration and the Area faculty.

Service to government or professional organization.

Reviewer/Panels for Research proposals

1. Served as a reviewer for the Scientific and Technological Research Fund, (*Agencia Nacional de Promoción Científica del FONCyT*), Argentina 2006.
2. Served as a reviewer for the Superior Council of the National Fund for Scientific & Technological Development (FONDECYT), Chile, 2008.
3. Served as a reviewer for the IB50K Contest for Business Plans Based on Technology 08/09, organized by the Balseiro Institute, the National Atomic Energy Commission, Universidad Nacional de Cuyo, Argentina, 2009. (2 proposals reviewed)
4. Served as a **NSF reviewer and panelist**, Mechanics of Materials (MOM), panel on multiscale modeling, January 2010. (12 proposals reviewed)
5. Served as a **Ad-Hoc NSF reviewer** for Metals & Metallic Nanostructures (MMN), Jan-Feb. 2010.
6. **NIST**: Participated of the *Workshop on Quantitative Tools for Conditional Assessment of Aging Infrastructure* at NIST, May 4-5, 2010.
(http://www.nist.gov/mml/materials_reliability/workshop-on-quantitative-tools-for-condition-assessment-of-aging-infrastructure.cfm)
7. Served as a **NSF reviewer and panelist** “Structural Materials and Mechanics (SMM, CMMI), panel on mechanics of materials, December 2011. (11 proposals reviewed)
8. Served as a **reviewer** Icelandic Research Fund (IRF), October 2012.
9. Served as a **NSF reviewer and panelist** “Mechanics of Materials (MoM, CMMI) panel on complex materials, December 2012. (8 proposals reviewed)
10. Served as **Ad-Hoc NSF reviewer** “Mechanics of Materials” (MoM, CMMI) program. May/June 2013.

11. Served as NSF CAREER reviewer and panelist “Structural Materials and Mechanics (SMM, CMMI), virtual panel on cement and concrete, October, 2013.
12. Served as Ad-Hoc NSF reviewer “SI2-SSI”, November 2014.
13. NSF review and panelist “Mechanics of Materials and Structures” (MOMS, CMMI), January 2014.

Editorial Boards for international Journals:

1. Associate Editor, *International Journal of Experimental and Computational Biomechanics* since 2013
2. Member of the Editorial Board of the *ASTM Journal of Advances in Civil Engineering Materials* (ACEM) since 2013

Other Editorial Activities/Book Proceedings:

1. 1997-2000 Technical assistant of Prof. Horacio Espinosa (Purdue Univ.) for the design and edition of the magazine “Mechanics” and maintenance of the American Academy of Mechanics Web Page (www.AAMech.org).
2. Associate Editor and member of the editorial board in “Mecánica Computacional” Volume XXIII. Number 4. Computational Mechanics of Solids and Structures in Industry, Edts. Gustavo C. Buscaglia, Enzo A. Dari, Oscar M. Zamonsky. <http://www.cimec.org.ar/ojs/index.php/mc/issue/view/43>
3. Associate Editor and member of the editorial board (with R. Lebensohn) in “Mecánica Computacional” Volume XXIII. Number 3. Multiscale Modeling of Solids, , Edts. Gustavo C. Buscaglia, Enzo A. Dari, Oscar M. Zamonsky. <http://www.cimec.org.ar/ojs/index.php/mc/issue/view/42>
4. Editor of the 2009 Spring MRS Proceedings “Structure-function relationships in biomaterials/biominerals and bio-mimetic systems”, Eds. D. Kisailus, L. Estroff, H. Gupta, W. Landis, P. Zavattieri, Volume 1187, 2009. Cambridge University Press, ISBN: 1605111600 / 1-60511-160-
5. “*Mechanics of Biological Systems and Materials*”, Volume 5, 2012 Conference Proceedings of the Society for Experimental Mechanics (SEM) Series: Preface, B.C. Prorok, F. Barthelat, C.S. Korach, K.J. Grande-Allen, E. Kipke, G. Lykofatitits, P. Zavattieri. Springer, ISSN: 21915644 ISBN: 978-146144426-8
6. “*Mechanics of Biological Systems and Materials*”, F. Barthelat, C.S. Korach, P.D. Zavattieri, Volume 6, 2013, Conference Proceedings of the Society for Experimental Mechanics (SEM), in preparation.
7. “*Mechanics of Biological Systems and Materials*”, F. Barthelat, C.S. Korach, P.D. Zavattieri, Volume 7: Proceedings of the 2014 Annual Conference on Experimental

and Applied Mechanics (Conference Proceedings ... Society for Experimental Mechanics Series)

8. Bajaj, P. Zavattieri, M. Koslowski, & T. Siegmund (Eds.). Proceedings of the Society of Engineering Science 51st Annual Technical Meeting, October 1-3, 2014 , West Lafayette: Purdue University Libraries Scholarly Publishing Services, 2014. <http://docs.lib.purdue.edu/ses2014/>
9. “Mechanics of Biological Systems and Materials”, Volume 6: Proceedings of the 2015 Annual Conference on Experimental and Applied Mechanics (Conference ... Society for Experimental Mechanics Series)

Reviewer for International Journals

Advanced Materials, ASTM Journal of Advances in Civil Engineering Materials, Applied Physics Letter, Chemical Society Reviews, Computational Mechanics, Computer Methods in Applied Mechanics and Engineering, Engineering Fracture Mechanics, Experimental Mechanics, Experimental Techniques, Fatigue and Fracture of Engineering Materials and Structures, Finite Elements in Analysis and Design, Journal of Applied Mechanics, Journal of Applied Physics, Journal of Composite Materials, Journal of Computational and Applied Mathematics, Journal of Geotechnical and Geoenvironmental Engineering, Journal of Material Research, Journal of Materials Engineering and Performance, Journal of Manufacturing Science and Engineering, Journal of Tribology Int. J. Experimental and Computational Biomechanics, International Journal of Fracture International Journal of Hydrogen Energy, International Journal of Mechanics and Materials in Design, International Journal for Multiscale Computational Engineering International Journal of Numerical Methods in Engineering, International Journal of Plasticity, International Journal of Solids and Structures, Materials and Structures, Metallurgical and Materials Transactions A, Modelling and Simulation in Materials Science and Engineering, Plasma Processes and Polymers, Philosophical Magazine & Philosophical Magazine Letters, Surface Engineering, Smart Materials and Structures, Extreme Mechanics Letters.

Referee for the following conference proceedings books:

1. IMECE'01, (ASME International Mechanical Engineering Congress).
2. IMECE'04, (ASME International Mechanical Engineering Congress).
3. IMECE'10, (ASME International Mechanical Engineering Congress).
4. Mecánica Computacional, Vol. XXIII (Proceedings of the Argentinean Congress on Computational Mechanics ENIEF2004),
5. Mecánica Computacional, Vol. XXIV (Proceedings of the Argentinean Congress on Computational Mechanics MECOM 2005),
6. Mecánica Computacional, Vol. XXIV (Proceedings of the Argentinean Congress on Computational Mechanics MECOM-CILAMSE 2010),
7. MRS (Material Research Society) – Spring 09 Proceedings.

8. 17th APS (American Physical Society)- Shock Compression in Condense Matter (SCCM), 2011.

Symposium Organizer:

1. “*Research on computational mechanics of solids and structures in the industry*“, for the, **XIV Congress on Numerical Methods and their Applications ENIEF 2004**, S. C. de Bariloche, Argentina, Nov. 8-11, 2004
2. “*Multiscale modeling of the mechanical behavior of solids: from atomistic simulations to engineering applications*“ for the **XIV Congress on Numerical Methods and their Applications ENIEF 2004**, S. C. de Bariloche, Argentina, Nov. 8-11, 2004.
3. “*Advances and Applications of Meshfree and Extended Finite Element Methods*” for the **9th US National Congress on Computational Mechanics (USNCCM)** held in San Francisco, CA, USA July 2007.
4. **First Argentinean Congress on Aeronautical Engineering**, Member of the Scientific Committee (Area of Mechanics, Materials and Structures), La Plata, Dec. 3-5, 2008.
5. “*Structure-function relationships in biomaterials/biominerals and bio-mimetic systems*” for the **2009 Spring MRS Meeting**, San Francisco, USA, April 2009.
6. “*Modeling of materials for coupled problems*”, IX Argentinean Congress on Computational Mechanics, **XXXI Iberian-Latin-American Congress on Computational Methods in Engineering, II South American Congress on Computational Mechanics**, Buenos Aires, Argentina 15-18 November 2010.
7. “Symposium 3.4: *Mechanics of Materials across Multiple Length Scales*” , **48th Annual Technical Meeting of Society of Engineering Sciences (SES)**, Evanston, IL, Oct. 12-14, 2011.
8. "Multiscale modeling and simulation of complex materials and systems", for the **12th Pan American Congress of Applied Mechanics (PACAM XII)**, held in Port of Spain, Trinidad, Jan 2-6, 2012.
9. **2nd International symposium on the mechanics of biological systems and materials**, as part of the **SEM XII International Congress and Exposition on Experimental and Applied Mechanics**, June 2012.
10. “*Computational Modeling of Damage and Fracture in Solids*” , **49th Annual Technical Meeting of Society of Engineering Sciences (SES)**, Georgia Tech, Atlanta GA, Oct. 10-12, 2012.
11. **3rd International symposium on the mechanics of biological systems and materials**, as part of the **SEM XIII International Congress and Exposition on Experimental and Applied Mechanics**, June 2013.
12. “*Material Design and Biomimetic Material Concepts*”, **50^h Annual Technical Meeting of Society of Engineering Sciences (SES)**, Brown University, Providence, RI, , July 28-31, 2013.

13. “Computational and Experimental Investigations of Bio-Inorganic Interfaces” in the Biological and Biomimetic Materials track for the **2014 Society of Engineering Science (SES) 51st Annual Technical Meeting**.
14. “Bridging Scales in Heterogeneous Materials”, **MRS Fall Meeting**, 2014.
15. “Bridging size scales in hierarchical materials: Multiscale modeling and experiments”, First PanAmerican Congress on Computational Mechanics, **PANACM 2015**, April 27-29, 2015, Buenos Aires, Argentina.
16. Scientific Advisory Board member and symposium organizers for the 14th International Conference on Fracture (**ICF14**), to be held in Rhodes, Greece, June 18-23, 2017.

Conference Organizer:

Prof. Zavattieri was the main organizer and Secretary of the 51st Society of Engineering Science (SES) Annual Technical

SES at Purdue 2014: Member of the Executive Committee and main proposers of the **51st Society of Engineering Science (SES) Annual Technical** meeting to take place in Purdue University on Oct. 1-3, 2014. Prof. Zavattieri prepared the proposal and presented it personally at the SES Board of Directors in Georgia Tech on Oct. 10th, 2012. Status: proposal accepted by the SES. Pablo Zavattieri was also Track organizers (for Biological and Biomimetic Materials and the Mechanics of Solids Tracks), and Symposium organizer.