Mark A. Nicosia, Ph.D.
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Widener University
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EDUCATION

1997 Ph.D., Mechanical Engineering, Penn State University
1992 B.S., Mechanical Engineering, Penn State University

PROFESSIONAL EXPERIENCE

Academic

9/2015-present	Professor of Mechanical Engineering Widener University; Chester, PA
7/09-present	Chair, Department of Mechanical Engineering Widener University; Chester, PA
5/05-9/2015	Associate Professor of Mechanical Engineering Widener University; Chester, PA
8/02-5/04	Assistant Professor of Biomedical Engineering University of Minnesota; Minneapolis, Minnesota
9/99-7/02	Research Associate, Division of Cardiothoracic Surgery, University of Wisconsin; Madison, Wisconsin
8/99-5/02	Instructor, Department of Biomedical Engineering University of Wisconsin; Madison, Wisconsin
9/97-9/99	Postdoctoral Training Fellow, Institute on Aging University of Wisconsin; Madison, Wisconsin
8/92-8/97	Research Assistant, Department of Mechanical Engineering, Penn State University; University Park, Pennsylvania
8/91-5/92	Undergraduate Student Teaching Intern Penn State University; University Park, Pennsylvania

Industry

6/04-5/05 Senior Engineer, Biomechanics Practice
Exponent Failure Analysis Associates, Inc., Philadelphia, PA

AWARDS, SCHOLARSHIPS, AND FELLOWSHIPS

2015 Nominated for the Widener University *Outstanding Researcher* Award

2011, 2012 Nominated for the Widener University *Fitz Dixon Innovation in Teaching* Award

2008 Inclusion in *Who's Who in America*

2006, 2007 Inclusion in *Who's Who Among America's Teachers*

2005 Election into Tau Beta Pi Engineering Honor Society as "Eminent Engineer"

2001-2002 National Research Service Award (NIH/NHLBI)

1997-1999 National Research Service Award (NIH/NIA)

1995 Phi Kappa Phi National Honor Society

PROFESSIONAL ASSOCIATIONS

Professional Society Membership

American Society of Mechanical Engineers (1998-present)
- Treasurer, Philadelphia Regional ASME Chapter (2008-2009, 2009-2010)
- Chair, Philadelphia Regional ASME Chapter (2007-2008)
- Senior Director, Philadelphia Regional ASME Chapter (2006-2007)

Dysphagia Research Society (1998-present)
- Board of Directors, member (2016-present)
- Chair, Membership Committee (2016-present)
- Meeting Program Committee (2008, 2014, 2015, 2016)

Editorial Responsibilities

Proposal reviewer for:

Italian Ministry of Health (October 2010, October 2013)
Cariplo Foundation (2009 - 2011)
Georgian National Science Foundation (October, 2008)
French National Research Programme on Food and Human Nutrition (May, 2007)
Wellcome Trust (April, 2007)
Toronto Rehabilitation Institute (August, 2006)
U.S. Civilian Research and Development Foundation (May, 2005)
Natural Sciences and Engineering Research Council of Canada (January, 2005),
NIH SBIR/STTR Study Section (2003-2004)

Reviewer for:

ASAIO Journal, *Dysphagia*, *Physical Review Letters*, *Archives of Applied Mechanics*, *Journal of Biomechanical Engineering*, *Medical Engineering and Physics*, *Computers in Biology and Medicine*, *Journal of Speech, Hearing, and Language Research*, *Endoscopy*, *Journal of Biomechanics*, *Mathematical and Computer Modeling of Dynamical Systems, Cardiovascular Engineering and Technology, Journal of Texture Studies, IEEE Transactions on Biomedical Engineering*

CONTRIBUTIONS TO ACADEMIC PROGRAMS

Taught the following courses:

Widener University

ENGR 111 – Engineering Techniques (Lecture and Laboratory sections)
ENGR 213H – Statics (Honors)
ENGR 214 – Dynamics
ENGR 314 – Introduction to Control Systems
ENGR 320 – Fluid Mechanics
ENGR 323 – Mechanics of Deformable Bodies
ENGR 325 – Thermodynamics
ENGR 328 – Computational Methods in Engineering
ENGR 636 – Finite Elements (graduate)
ENGR 681 – Fluid Mechanics (graduate)
ENGR 685 – Aerodynamics (graduate)
CHE 329 – Transport Phenomena
ME 215 – Fundamentals of Engineering Materials and Design
ME 303 – Mechanical Measurements
ME 351 – Kinematics
ME 354 – Computations in Mechanical Engineering
ME 453 – Engineering Vibrations

ME 471 – Biomechanics (developed)
ME 474 – Introduction to the Finite Element Method

University of Minnesota
BMEn 5201 – Advanced Biomechanics (developed)
BMEn 5212 – Tissue Mechanics (developed)
BMEn 4001 – Biomedical Engineering Design I
BMEn 4002 – Biomedical Engineering Design II

University of Wisconsin-Madison
BME 200, 201, 300, 301, 400 – Biomedical Engineering Design

SPONSORED PROJECTS

1. *ZipStich Finite Element Modeling* (P.I. Prof. Nicosia), ZSX Medical, LLC and Ben Franklin Technology Partners, SEP, 7/1/2009-12/31/2009, $18,000 (awarded; completed).

2. *Microstructural Modeling of Three-Dimensional Woven Fiber Composite Materials* (P.I. Prof. Nicosia), V-System Composites, 12/1/2008-9/1/2009, $83,990 (awarded; completed).

   Note: This is a subcontract from V-System Composites under Army Contract W911W6-07-D-003, Program Manager: Dr. Jeff Lawrence.

3. *Computational Modeling of Oropharyngeal Bolus Flow* (P.I.: Prof. Nicosia), The National Institutes of Health, 7/1/2008-6/30-2010, $106,124 (awarded, completed).

4. *Computational Modeling of Mitral Valve Suturing Technique* (P.I. Prof. Nicosia), Superior Surgical Solutions, 4/1/2008-12/31/2008, $12,252 (awarded; completed).

   Note: This is a subcontract from Superior Surgical Solutions as part of a larger project funded by NeoChord, Inc. Program Manager: Dr. Karyn Kunzelman.

5. *Innovative Composite Technology for Rotorcraft Drive System Component Applications* (P.I. Prof. Nicosia; Co-I. Prof. Slomiana), V-System Composites, 1/1/2008-10/1/2008, $70,669 (awarded; completed).

   Note: V-System Composites received funding for the above project from Ben Franklin Technology Partners based on a

proposal jointly authored by Prof. Nicosia and Mr. Scott Holmes (V-System Composites).

6. *Microstructural Modeling of Woven Fiber Composite Materials* (P.I. Prof. Nicosia), V-System Composites, 5/7/2007-5/6/2008, $64,990 (awarded; completed).

    Note: This is a subcontract from V-System Composites under Army Contract W911W6-07-D-003, Program Manager: Mr. Scott Holmes.

7. *Numerical Simulation of Percutaneous Balloon Mitral Valvomoty* (P.I.: Prof. Nicosia), San Diego Supercomputer Center, 5000 CPU Hours on IBM p655 and/or p690 computers (funded June, 2006; completed).

8. *Advanced Analysis of Velocimetry Data* (P.I.: Prof. Victor Barocas, University of Minnesota; subcontract to Prof. Nicosia for $11,327 in year 1 and $11,628 in year 2), National Institutes of Health, submitted October 28, 2005 (not funded).

9. *Biomechanical Modeling of Aortic Valve Leaflets* (P.I.: Prof. Nicosia; Co-I: Prof. Zhu), The National Science Foundation, 6/1/03-5/30/05, $346,126, submitted October 13, 2005 (not funded).

10. *Experimental Analysis of GARD Anti-Reflux Device* (P.I.: Prof. Nicosia), Biomedix, S.A., $8,827 (awarded, complete).

PUBLICATIONS

Refereed Papers in Journals

1. Ho, A, Affoo R, Rogus-Pulia N, **Nicosia MA**, Inamoto Y, Saitoh E, Green S, Fels S. *Inferring the effects of saliva on liquid bolus flow using computer simulation*. Computers in Biology and Medicine. 89(1):304-313, 2017

2. **Nicosia MA**, Wood DA, and Mazzucco D. *Mechanical response of uterine tissue under the influence of hemostatic clips: a non-linear finite-element approach.* J Biomed Sci Engr, 6(12A):21-28, 2013.

3. **Nicosia MA**. *Theoretical estimation of shear rate during oropharyngeal swallowing: Effect of boundary slip.* J. Texture Studies. 44: 132-139, 2013.

4. Schievano S. Kunzelman K, **Nicosia MA**, Cochran RP, Einstein DR, Khambadkone S, Bonhoeffer P. *Percutaneous Mitral Valve Dilatation:*

Single Balloon versus Double Balloon - A Finite Element Study. J. Heart Valve Disease, 18(1):28-34, 2009.

5. Hewitt A, Hind A, Kays S, **Nicosia M**, Doyle J, Tompkins W, Gagnon R, Robbins J. *Standardized instrument for lingual pressure measurement.* Dysphagia 23(1):16-25, 2008.

6. **Nicosia MA**, Robbins J. *The usefulness of the line spread test as a measure of liquid consistency.* Dysphagia, 22(4):306-311, 2007.

7. Brasseur JG, **Nicosia MA**, Pal A, Miller LS. *Function of longitudinal vs circular muscle in esophageal peristalsis, deduced with mathematical modeling.* World Journal of Gastroenterology 13(9): 1335-1346, 2007 (Peer-reviewed review paper).

8. **Nicosia MA**. *A planar finite element model of bolus containment in the oral cavity.* Computers in Medicine and Biology, 37(10):1472-1478, 2007.

9. **Nicosia MA**. *A theoretical framework to analyze soft-tissue bending experiments*. J. Biomech. Engr, 129(1), 117-120, 2007.

10. Hind JA, **Nicosia MA**, Gangnon R, Robbins JA. *The effects of intraoral pressure sensors on normal young and old swallowing patterns.* Dysphagia 20(4):249-253, 2005

11. Einstein DR, Kunzelman, KS, Reinhall PG, **Nicosia MA**, Cochran RP. *Nonlinear fluid-coupled finite element analysis of the mitral valve.* J. Heart Valve Disease 14(3): 376-385, 2005.

12. Einstein DR, Kunzelman, KS, Reinhall PG, **Nicosia MA**, Cochran RP. *The relationship of normal and abnormal microstructural proliferation to the mitral valve closure sound.* J. Biomech. Engr. 127:134-147, 2005.

13. Quigley M, Iskandar B, **Nicosia MA**, Quigley V. *Temporal and spatial patterns of CSF flow in the foramen magnum in normal subjects and Chiari I patients*. Radiology 232:229-236, 2004.

14. Einstein DR, Kunzelman KS, Reinhall PG, **Nicosia MA**, Cochran RP. *Hemodynamic determinants of the mitral valve closure sound: A finite element study.* IEEE Med. Biol. Eng. Comput. 42(6):832-846, 2004.

15. Miller LS, Kim JK, Dai Q, Mekapati J, Izanec J, Chung C, Liu JB, Sanderson A, Bohning M, Desipio J, Gandegok J, Harberson JJ, Schneck C, **Nicosia MA**, Thangada V, Thomas B, Copeland B, Miller E, Miller A, Ahmed N, Brasseur JG. *Mechanics and hemodynamics of esophageal varices during peristaltic contraction.* Am. J. Physiol. 287: G830-G835, 2004.

16. **Nicosia MA**, Cochran RP, Einstein D, Rutland CJ, Kunzelman KS. *A coupled fluid structure finite element model of the aortic valve and root.* J. Heart Valve Disease 12:781-789, 2003.

17. Einstein D, Reinhall P, **Nicosia MA**, Cochran RP, Kunzelman KS. *Dynamic finite element implementation of nonlinear, anisotropic hyperelastic biological membranes*. Comp. Meth. Biomech. Biomed. Engr. 6(1): 33-44, 2003.

18. **Nicosia MA**, Brasseur JG. *A mathematical model for estimating muscle tension in vivo during esophageal bolus transport.* J. Theoretical Biol., 219:235-255, 2002.

19. **Nicosia MA**, Kasalko J, Einstein D, Cochran RP, Kunzelman KS. *Biaxial material properties of the porcine aortic wall.* J. Heart Valve Disease 11(5): 680-688, 2002.

20. **Nicosia MA**, Brasseur JG, Liu J-B, Miller LS. *Local longitudinal muscle shortening of the esophagus from high frequency ultrasonography*. Am. J. Physiol. 281(4):1022-1033, 2001.

21. **Nicosia MA**, Robbins J. *The fluid mechanics of bolus ejection from the oral cavity.* J. Biomech., 34(12):1537-1544, 2001.

22. Hind JA, **Nicosia MA**, Carnes ML, Robbins J. *Comparison of effortful and non-effortful swallowing in normal middle-aged and elderly subjects*. Arch. Phys. Med. Rehab. 82(12):1661-1665, 2001.

23. **Nicosia MA**, Hind JA, Roecker EB, Carnes M, Doyle J, Dengel GA, Robbins J. *Age effects on the temporal evolution of isometric and swallowing pressure*. J. Geronot., Med. Sci., 55A:M634-M640, 2000.

Papers in Conference Proceedings

1. Ho AK, **Nicosia MA**, Green S, Fels S. *An Image-based model of human swallowing using smoothed-particle hydrodynamics*. GRAND 2014 Conference (Graphics, Animation, and New Media), Ottawa, Canada, May 14-16, 2014.

2. **Nicosia MA**, Vineis F, Lawrence J, Holmes ST, *Microstructural modeling of woven fiber composites*. Proceedings of the 17th International Conference on Composites or Nano Engineering, Honolulu, HI, July 26 - August 1, 2009.

3. **Nicosia MA**, El-Sayed A, Nicosia EW, Young R., *Biomechanical Analyses of Oropharyngeal Swallowing.* Proceedings of the 1st International Workshop on Dynamic Modeling of Oral, Pharyngeal and Laryngeal Complex for Biomedical Applications, Vancouver, BC, June 26-27, 2009.

4. **Nicosia MA**, Vineis F, Lawrence J, Holmes ST. *Microstructural Modeling of Three-Dimensional Woven Fiber Composites.* Proceedings of TEXCOMP9: International Conference on Textile Composites. October 13-15, 2008.

5. Mkandawire C, **Nicosia MA**, Moore TLA, Corrigan CF. *Postural stability of stand-up forklift operators in response to normal braking procedures.* Proceedings of IMECE05: 2005 ASME International Mechanical Engineering Congress and Exposition, November 5-11, 2005.

6. **Nicosia MA**, Lee JS. *Biomedical engineering: Integrating ethics into design*. Proceedings of the 2nd Annual "Integrating Ethics into Technical Education" Conference, June 2000.

Invited Lectures and Presentations

1. **Nicosia MA.** *Microstructural Modeling of Three-Dimensional Woven Fiber Composites.* Presented to the Philadelphia Section of the Society of Plastics Engineers, University of Delaware, Newark, DE, October 8, 2009.

2. **Nicosia MA.** *Biomechanical Analysis of Oropharyngeal Swallowing.* Department of Electrical and Computer Engineering, University of British Columbia, Vancouver, BC. September 15, 2008.

3. **Nicosia MA.** *Biomechanical analyses of gastrointestinal and cardiovascular physiology.* Widener Science Seminar, Widener University, Chester, PA. September 26, 2005.

4. **Nicosia MA.** *Biomechanical analyses the gastrointestinal and cardiovascular systems.* Department of Mechanical Engineering, University of Minnesota, Minneapolis, MN. March 12, 2003.

5. **Nicosia MA**. *Advanced computational and experimental analyses of thoracic physiology.* Exponent Failure Analysis Associates. Philadelphia, PA. March 11, 2002.

6. **Nicosia MA**. *Advanced computational and experimental analyses of thoracic physiology.* Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA. February 6, 2002.

7. **Nicosia MA**. *Advanced computational and experimental analyses of thoracic physiology.* Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN. January 28, 2002.

8. **Nicosia MA**. *Advanced computational and experimental analyses of thoracic physiology.* Department of Mechanical Engineering, Temple University, Philadelphia, PA. January 22, 2002.

9. **Nicosia MA**. *Biomechanical analysis and modeling of swallowing.* Grand Rounds for Gastroenterology and Hepatology Section, University of Wisconsin Medical School. October 2, 2001.

10. **Nicosia MA**. *Advanced computational and experimental analyses of thoracic physiology.* Biomedical Engineering Seminar Series. University of Wisconsin. April 30, 2001

11. **Nicosia MA**. *Biomechanical analysis and modeling of swallowing*. Inaugural lecture in the Lindberg Lecture Series, Department of Mechanical Engineering, University of Wisconsin-Madison, February 3, 1999.

12. **Nicosia MA**. *The mechanics of the esophagus during swallowing*. Department of Gastroenterology, Temple University Hospital, December 4, 1995.

13. **Nicosia MA**. *A model describing the passive properties of esophageal smooth muscle*. Department of Chemical Engineering, Penn State University, October 14, 1994.

Invited Workshop Presentations

1. **Nicosia MA,** *Fluid Modeling Challenges for Swallowing,* An invited lecture as part of symposium entitled *The Future for Dysphagia Research and Treatment – Predictive Analytical Models to Improve Long Term Care in Assessment, Treatment, and Recovery.* 22nd Annual Meeting of the Dysphagia Research Society, Nashville, TN, March 6-8, 2014. (I also helped organize and plan the symposium.)

2. **Nicosia MA**, El-Sayed A, Nicosia EW, Young R., *Biomechanical Analyses of Oropharyngeal Swallowing.* An invited lecture for the 1st International Workshop on Dynamic Modeling of Oral, Pharyngeal and Laryngeal Complex for Biomedical Applications, Vancouver, BC, June 26-27, 2009.

3. **Nicosia MA.** *Lingual forces and oral transport: Mechanics and modeling.* An invited lecture for the "Novel Assessment Tools in Swallowing Evaluation: Relating Physiology to the Mechanics of Oro-Pharyngo-Esophageal

Function" Symposium at the Twelfth Annual Scientific Meeting of the Dysphagia Research Society. San Francisco, CA, October 2-5, 2003.

4. **Nicosia MA**. *Physical properties of food and liquid.* A seminar for the "Geriatric Dysphagia: Towards Evidence-Based Practice" Conference. Madison, Wisconsin, September 21 2001.

5. **Nicosia MA**. *Oral pressures and fluoroscopy*. An invited lecture for the "Imaging Plus" Symposium at the Eighth Annual Scientific Meeting of the Dysphagia Research Society. New Orleans, LA, October 15-17. 1998.

Conference Presentations

1. **Nicosia MA,** Validation Strategies for Simulation of Oropharyngeal Fluid Mechanics, *1st International Workshop on Biomechanical and Parametric Modeling of Human Anatomy,* January 28-29, 2013, Vancouver BC.

2. **Nicosia MA,** Wood, DA, Lawrence JM. *Advances in Micro-Mechanical Modeling of Textile Composites for Real World Fiber Architectures* Presentation at TEXCOMP: 10th International Conference on Textile Mechanics, Lille, France, October 25-29, 2010 (oral presentation).

3. **Nicosia MA,** *Computer Simulation of Hemostasis for Wound Closure Applications.* Oral presentation at the Design of Medical Devices Conference, April 13-15, 2010, Minneapolis, MN (oral presentation).

4. **Nicosia MA**, Vineis F, Lawrence J, Holmes ST, *Microstructural modeling of woven fiber composites*. Presentation at the 17th International Conference on Composites or Nano Engineering, Honolulu, HI, July 26 - August 1, 2009 (oral presentation).

5. **Nicosia MA**, Nicosia EW, Young R, El-Sayed, A. *Containment of Thickened Liquids in an Experimental Model of the Oral Cavity*. Presentation at the 17th Annual Scientific Meeting of the Dysphagia Research Society, New Orleans, LA, March 5-7, 2009 (poster).

6. **Nicosia MA**, Vineis F, Lawrence J, Holmes ST. *Microstructural modeling of three-dimensional woven fiber composites.* Presentation at TEXCOMP: 9th International Conference on Textile Mechanics, Newark, DE, October 13-15, 2008 (oral presentation).

7. Scheivano S, **Nicosia M**, Cochran RP, Khambadkone S, Einstein DR, Bonhoeffer P, Kunzelman KS. *Percutaneous mitral valve dilatation: Single versus double balloon: A finite element analysis.* 4th Annual Meeting of the Society for Heart Valve Disease, New York, NY, June 15-18, 2007 (oral presentation).

8. **Nicosia MA.** A planar finite element model of bolus containment in the oral cavity. 15th Annual Scientific Meeting of the Dysphagia Research Society, Vancouver, CA, March 8-10, 2007 (oral presentation).

9. Godin N, **Nicosia MA.** Pressure-flow characteristics of the "GARD" anti-reflux device from in vitro testing. 14th United European Gastroenterology Week, Berlin, Germany, October 21-25, 2006 (poster presentation).

10. Stay M, Barocas V, **Nicosia M**, Tranquillo RT. *Overlapping grids for coupled flow simulation of engineered cardiovascular valves.* BMES Annual Fall Meeting, October 13-16, 2004, Philadelphia, PA (poster presentation).

11. Chandran PL, **Nicosia MA**, Barocas VH. *Multilayer, multi-scale modeling of engineered tissues.* ASME Summer Bioengineering Meeting, Key Biscayne, FL, June 2003 (oral presentation).

12. Hind JA, **Nicosia MA**, Robbins JA. *Variability of lingual isometric pressure in adults.* Dysphagia 17(2): 180, 2002 (poster presentation).

13. **Nicosia MA**, Cochran RP, Einstein D, Sebastian J, Kunzelman KS*. A coupled fluid-structure finite element model of the aortic valve and root.* 6th Annual Hilton Head Workshop on Prosthetic Heart Valves. Hilton Head, SC. March 8, 2002 (oral presentation).

14. **Nicosia MA**, Cochran RP, Einstein D, Rutland CJ, Kunzelman KS*. A coupled fluid-structure finite element model of the aortic valve and root.* Proceedings of the First Biennial Meeting of the Society for Heart Valve Disease. June 15-18, 2001, London, England (oral presentation).

15. Kasalko J, Kunzelman KS, **Nicosia MA**, Cochran RP. *Biaxial material properties of the porcine aortic wall.* Proceedings of the First Biennial Meeting of the Society for Heart Valve Disease. June 15-18, 2001, London, England (oral presentation).

16. Kunzelman K, Einstein D, **Nicosia MA**, Cochran R*. Computer modeling for evaluation of cardiac valvular function*. Proceedings of the 2000 World Congress on Medical Physics and Biomedical Engineering. Chicago, IL, July 23-28, 2000 (oral presentation).

17. **Nicosia MA**, Brasseur J, Liu J-B, Miller LS. *Longitudinal shortening in the esophagus*. Gastroenterology. 118:A133, 2000 (poster presentation).

18. Hind JA, **Nicosia MA**, Carnes ML, Robbins JA. *Comparison of effortful and non-effortful swallows in healthy adults.* Dysphagia. 14(2):119, 1999 (oral presentation).

19. Hoffman SM, **Nicosia MA**, Robbins JA. *Line spread test – is it able to measure viscosity.* Dysphagia. 14(2):124, 1999 (poster presentation).

20. Robbins JA, Coyle J, Dengel G, **Nicosia M**, Kennel T, Carnes M, Wood J, Doyle J, Luschei E. *MRI assessment of lingual sarcopenia.* Dysphagia. 14(2):125, 1999 (poster presentation).

21. **Nicosia MA**, Brasseur JG, Kern MK, Massey BT*. Space-time evolution of active and passive muscle tone during swallowing*. Dysphagia. 13(2): 111, 1998 (poster presentation).

22. Toklu E, Brasseur JG, **Nicosia MA**, Massey BT*. Local segmental structure of peristaltic contractions through the esophagus*. Dysphagia. 12(2):113, 1997 (oral presentation).

23. **Nicosia MA**, Brasseur JG, Liu J-B, Miller LS. *Local longitudinal shortening of the esophagus from high frequency ultrasonography*. Dysphagia. 12(2):109, 1997 (oral presentation).

24. **Nicosia MA**, Brasseur JG. *A model for the mechanical properties of esophageal muscle*. Dysphagia. 10(4):139, 1995 (oral presentation).

25. Li M, Brasseur JG, Hsieh P, **Nicosia MA**, Kern MK, Massey BT*. A conversion methodology to analyze manometric pressure data in space-time*. Gastroenterology. 106:A530, 1994 (poster presentation).

Patents

1. *Surgical Device* (co-inventor with D. Mazzucco, E Rugart, R. Ransden, A. Bachman, R. Cargill, and E. Butt). #8,852,211, October 7, 2014.