RANGANATHAN PARTHASARATHY

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EDUCATION

PhD University of Kansas (KU), Bioengineering — Aug 2013
Graduated with Honors
Dissertation: Chemo-mechanical characterization of phase-separated dentin adhesives
Committee: Profs. Anil Misra and Paulette Spencer

MS University of Missouri-Kansas City (UMKC), Civil Engineering — Dec 2007
Thesis: Characterization of biomaterials using indigenously developed software SPF
Advisor: Prof. Ganesh Thiagarajan

BS Indian Institute of Technology-Madras (IITM), Civil Engineering — Jul 2005
Thesis: Biomimetic structures
Advisor: Prof. Srinivasan M Sivakumar
Minored in Applied Mechanics

HONORS AND AWARDS

Second Place, Graduate Engineering, Sigma Xi Research Showcase 2013
Awarded for work on characterizing and developing composition-property relationships for polymer phases in the dentin-adhesive interface

Summer Research Fellowship, KU 2010
Awarded for developing a micromechanical model for articular cartilage

Strobel Scholarship, KU 2008
Awarded for outstanding academic record

Outstanding Graduate Paper, American Concrete Institute 2007
Awarded by the Missouri Chapter for work on analysis of hybrid reinforced concrete beams

Honorable Mention, Pre-stressed Concrete Institute 2007
Awarded for design of pre-stressed concrete beam with efficient design and high load capacity

Outstanding Graduate Student, UMKC 2006
Awarded for outstanding academic record and leadership roles

RESEARCH EXPERIENCE

Tennessee State University, Nashville, TN Nov 2013 to Present
Research Associate, Nanomaterials Lab

- Developed higher order approach for computing continuum potential energy from molecular dynamics simulation using LAMMPS. The approach introduces new continuum variables to account for vibrational contribution to the potential energy.
- Measured average bond strength of Rhenium Diboride coating on Teflon substrate using customized versions of ASTM C633, D4541, as well as SEM imaging and segmentation of optical images.
- Predicted linear elastic mechanical properties of ferritic steels by applying granular micromechanics and Equivalent Inclusion method to homogenize individual phase properties from ab-initio calculations
- Assisted on modeling lithium ion battery to compute capacity fade in COMSOL

University of Kansas, Lawrence, KS 2008 to 2013
Graduate Research Assistant, Bioengineering Research Center

- Analyzed phase separation of dentin adhesive monomers in water using chemo-metrics and Fourier Transform Infrared spectra
- Characterized polymer phases along phase boundary for water diffusion and absorption, swelling, mechanical properties in linear elastic range and polymer-water interaction. The polymer-water interaction was modeled using a Flory interaction parameter
- Developed constitutive model for porous, fluid-saturated, chemically active media using micromechanics and continuum mixture theory
- Applied the model to predict quasi-static and rate-dependent mechanical behavior of articular cartilage and porous rocks
- Developed composition-property relationships for dentin adhesive and worked with polymer chemists to improve monomer solubility and wet mechanical properties of dentin adhesive using high covalent cross-link density and hydrophilic functional groups

University of Missouri-Kansas City, Kansas City, MO 2005 to 2007
Graduate Research Assistant, Center for Research on Interfacial Structure and Properties

- Developed statistical analysis software involving principal component analysis and clustering to analyze composition of dentin-adhesive interface in composite restorations

Graduate Research Assistant, Civil Engineering

- Determined mechanical behavior in linear elastic range of concrete beams reinforced with a hybrid combination of steel and Fiber Reinforced Polymer using experimental testing and beam theory

COMPUTER SKILLS

Programming: Python, Shell script, C++
Computing Applications: Matlab, Maple
Software Packages: LAMMPS (Molecular dynamics), ABAQUS, COMSOL (Finite Element Analysis)
Platforms: Windows, Linux

TEACHING EXPERIENCE

Tennessee State University, Nashville, TN Nov 2013 to Present

Temporary instructor, Physics

- Taught theory and laboratory courses for undergraduate physics covering: mechanics, thermodynamics and electromagnetism
- Developed quizzes and exams, and graded them
- Conducted one-on-one concept-clearing sessions
- Taught the basics of the finite element method as part of material modeling workshop

University of Kansas, Lawrence, KS Aug 2008 to Aug 2010
Teaching Assistant, Bioengineering

- Lectured, graded assignments and conducted tutoring sessions for Biomaterials (Fall 2008), Computer Simulation in Biomechanics (Spring 2009), Biofluids (Fall 2009), Finite Element Analysis (Spring 2010)

University of Missouri-Kansas City, Kansas City, MO Jun 2006 to Jun 2007
Teaching Assistant, Civil Engineering

- Lectured, graded assignments and conducted tutoring sessions for Strength of Materials (Spring 2007), Engineering Statics (Spring 2007) and Calculus (Spring 2007)

PUBLICATIONS

Book Chapters

1. Misra, A., O. Marangos, R. Parthasarathy and P. Spencer (2013). Micro-scale analysis of compositional and mechanical properties of dentin using homotopic measurements. Biomedical Imaging and Computational Modeling in Biomechanics, Springer**:** 131-141.

2. Spencer, P., Q. Ye, J. Park, R. Parthasarathy, O. Marangos, A. Misra, B. S. Bohaty, V. Singh and J. S. Laurence (2013). Dentin/Adhesive Interface in Teeth. Structural Interfaces and Attachments in Biology. S. Thomopoulos, V. Birman and G. M. Genin, Springer**:** 133-151.

Journal Publications: Primary Contribution

1. Misra, A., R. Parthasarathy, Q. Ye, V. Singh and P. Spencer (2014). "Swelling equilibrium of dentin adhesive polymers formed on the water–adhesive phase boundary: Experiments and micromechanical model." Acta Biomaterialia 10(1): 330-342.

2. Misra, A., R. Parthasarathy, V. Singh and P. Spencer (2013). "Micro-poromechanics model of fluid-saturated chemically active fibrous media." ZAMM: Journal of Applied Mathematics and Mechanics/Zeitschrift für Angewandte Mathematik und Mechanik 95(2): 215-234

3. Misra, A., R. Parthasarathy, V. Singh and P. Spencer (2013). "Poromechanics parameters of fluid-saturated chemically active fibrous media derived from a micromechanical approach." Journal of Nanomechanics and Micromechanics 3(4).

4. Parthasarathy, R., A. Misra, J. Park, Q. Ye and P. Spencer (2012). "Diffusion coefficients of water and leachables in methacrylate-based crosslinked polymers using absorption experiments." Journal of Materials Science: Materials in Medicine 23(5): 1157-1172.

5. Ye, Q., R. Parthasarathy, F. Abedin, J. S. Laurence, A. Misra and P. Spencer (2013). "Multivariate Analysis of Attenuated Total Reflection Fourier Transform Infrared (ATR FT-IR) Spectroscopic Data to Confirm Phase Partitioning in Methacrylate-Based Dentin Adhesive." Applied Spectroscopy 67(12): 1473-1478.

6. Parthasarathy, R., G. Thiagarajan, X. Yao, Y.-P. Wang, P. Spencer and Y. Wang (2008). "Application of multivariate spectral analyses in micro-Raman imaging to unveil structural/chemical features of the adhesive/dentin interface." Journal of Biomedical Optics 13(1): 014020-014020-014029.

Journal Publications: Secondary Contribution

1. Singh, V., A. Misra, R. Parthasarathy, Q. Ye and P. Spencer (2014). "Viscoelastic properties of collagen–adhesive composites under water-saturated and dry conditions." Journal of Biomedical Materials Research Part A.

2. Abedin, F., Q. Ye, H. J. Good, R. Parthasarathy and P. Spencer (2014). "Polymerization-and solvent-induced phase separation in hydrophilic-rich dentin adhesive mimic." Acta Biomaterialia 10 (7): 3038-47.

3. Singh, V., A. Misra, R. Parthasarathy, Q. Ye, J. Park and P. Spencer (2013). "Mechanical properties of methacrylate-based model dentin adhesives: Effect of loading rate and moisture exposure." Journal of Biomedical Materials Research Part B: Applied Biomaterials 101(8): 1437-1443.

4. Spencer, P., Q. Ye, J. Park, A. Misra, B. S. Bohaty, V. Singh, R. Parthasarathy, F. Sene, S. E. de Paiva Goncalves and J. S. Laurence (2012). "Durable bonds at the adhesive/dentin interface: an impossible mission or simply a moving target?" Brazilian Dental Science 15(1):

5. Ye, Q., J. Park, R. Parthasarathy, F. Pamatmat, A. Misra, J. S. Laurence, O. Marangos and P. Spencer (2012). "Quantitative analysis of aqueous phase composition of model dentin adhesives experiencing phase separation." Journal of Biomedical Materials Research Part B: Applied Biomaterials 100(4): 1086-1092.

6. Ye, Q., J. Park, J. S. Laurence, R. Parthasarathy, A. Misra and P. Spencer (2011). "Ternary phase diagram of model dentin adhesive exposed to over-wet environments." Journal of Dental Research 90(12): 1434-1438.

Conference Presentations (Abstract-Reviewed): Primary Contribution

1. R. Parthasarathy, S. Aryal, L.Ouyang and A. Misra (2016) Atomistic to Continuum Homogenization. Engineering Mechanics Institute Conference, Nashville, TN.

2. Misra, A. and R. Parthasarathy (2013). Nonlinear micro-poromechanics of fluid saturated active fibrous media. Canadian Conference on Nonlinear Solid Mechanics, Montreal, Quebec.

3. Parthasarathy, R. and A. Misra (2013). Degree of swelling and sorption of chemically active materials modeled using granular micromechanics. Engineering Mechanics Institute Conference, Evanston, IL.

4. Spencer, P., Q. Ye, R. Parthasarathy, V. Singh, A. Misra and J. S. Laurence (2013). Structure/Property of Model Dentin Adhesive Exposed to Wet Environments. Society for Biomaterials. Boston, MA.

5. Ye, Q., R. Parthasarathy, S. E. de Paiva Goncalves, J. Park, A. Misra, O. Marangos and P. Spencer (2012). Aqueous Phase Properties of Model Dentin Adhesives Experiencing Phase Separation. 9th World Biomaterials Congress, Chengdu, China.

6. Parthasarathy, R. and A. Misra (2012). Micro-damage model for water saturated chemically active fibrous materials. Engineering Mechanics Institute Conference, Notre Dame, IN.

7. Parthasarathy, R., A. Misra and P. Spencer (2011). Application of soft tissue micromechanics model to condylar cartilage. International Association of Dental Research, San Diego, CA.

8. Parthasarathy, R. and G. Thiagarajan (2007). Experimental testing of flexural behavior of beams reinforced with a hybrid combination of FRP and mild steel. Proceedings of the Ninth Annual ACI Student Seminar on Cement and Concrete Research, Columbia, MO.

9. Parthasarathy, R., P. S. Vignesh and S. M. Sivakumar (2005). Twinning like behavior in tensional integrity structures. Proceedings of the International Conference on Smart Materials Structures and Systems, Bangalore, India.

Conference Presentations (Abstract-Reviewed): Secondary Contribution

1. Abedin, F., Q. Ye, P. Spencer, R. Parthasarathy, J. S. Laurence and A. Misra (2013). Hydrophilic-rich phase in dentin adhesive: Photo-polymerization and critical water content. International Association for Dental Research, Seattle, WA.

2. de Paiva Goncalves, S. E., Q. Ye, R. Parthasarathy, J. Park, A. Misra, O. Marangos and P. Spencer (2012). Dentin adhesive in overwet environment: Photoinitiator composition and concentration. International Association of Dental Research. Seattle, WA.

3. Misra, A., V. Singh, R. Parthasarathy, O. Marangos and P. Spencer (2011). Mathematical model for anomalous creep in model dentin adhesives. International Association of Dental Research, San Diego, CA.

4. Ye, Q., F. Pamatmat and R. Parthasarathy (2011). Water compatibility and phase diagram of model dentin adhesives. International Association of Dental Research, San Diego, CA.

Invited Seminar Presentations

1. R. Parthasarathy, S. Aryal, A. Misra and L. Ouyang (2016). Hydrophilic-rich phase in dentin adhesive: Photo-polymerization and critical water content. Invited Seminar Series, Civil and Environmental Engineering, Vanderbilt University, Nashville, Tennessee.

2. R. Parthasarathy, A. Misra, and P. Spencer (2013). Structure-Property relationships in biomedical polymers. Bioengineering Graduate Program, University of Kansas. Lawrence, KS.

PROFESSIONAL AFFILIATIONS

Bioengineering Student Council, University of Kansas, 2011
Treasurer, website coordinator

Structural Engineering Association of Kansas and Missouri, 2006-2007
Organized talks by professional engineers, led the UMKC team in the Big Beam competition organized by the Pre-stressed Concrete Institute.

PROFESSIONAL SERVICE

Reviewer

- Journal of Medical Engineering, Hindawi, 2016
- Journal of Biomechanical Engineering, 2016
- Journal of Nanomechanics and Micromechanics, 2014-present
- Journal of Engineering Mechanics, 2012-present
- Acta Biomaterialia, 2012
- Microscopy and Microanalysis, 2015
- Brazilian Dental Science, 2015

COMMUNITY SERVICE

Tennessee State University
Coordinated engineering expo for high-school seniors, Nashville, 2014

LANGUAGES

English: Superior Listener, Superior Speaker, Superior Reading and Writing
Tamil: Intermediate Listener and Speaker
Telugu and Hindi: Intermediate Listener, Speaker, Reading and Writing