

Ashutosh Goel

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Present Status

Professor (July 2023 – present)
Department of Materials Science and Engineering, Rutgers, The State University of New Jersey, Piscataway, NJ, USA

Previous Appointments

Associate Professor (July 2020 – June 2023)
Department of Materials Science and Engineering, Rutgers, The State University of New Jersey, Piscataway, NJ, USA

Assistant Professor (January 2014 – June 2020)
Department of Materials Science and Engineering, Rutgers, The State University of New Jersey, Piscataway, NJ, USA

Visiting Scientist (January 2019 – August 2019)
Sterlite Technologies Ltd., Aurangabad, Maharashtra, India
(On sabbatical from Rutgers University)

Senior Scientist (Glass & Optical fibers) (May 2012-December 2013)
Sterlite Technologies Ltd., Aurangabad, Maharashtra, India

Glass/Materials Scientist (March 2011 – April 2012)
Pacific Northwest National Laboratory, Richland, WA, USA

Postdoctoral researcher (January 2010 – March 2011)
Department of Ceramics and Glass Engineering, University of Aveiro, Portugal

Ph.D. researcher (June 2007 - December 2009)
Department of Ceramics and Glass Engineering, University of Aveiro, Portugal

Guest Researcher (March 2009 – May 2009)
Department of Materials Engineering and Environment, University of Modena and Reggio Emilia, Modena, Italy

Guest Researcher (October 2007- April 2008)
Department of Chemical and Biological Engineering, Chalmers University of Technology, Gothenburg, Sweden

Research Fellow (November 2005 - May 2007)
Department of Ceramics and Glass Engineering, University of Aveiro, Portugal

Research Fellow and Teaching Assistant (July 2004 – September 2005)
School of Physics and Materials Sciences, Thapar Institute of Engineering & Technology, Patiala, India

Education	Ph.D. (European Doctorate) in Materials Science and Engineering (2009) Title of thesis: Clinopyroxene-based glasses and glass-ceramics for functional applications Advisor: Professor J.M.F. Ferreira; Co-Advisor: Professor D.U. Tulyaganov Department of Ceramics and Glass Engineering, University of Aveiro, Portugal M.S. (Honors) Physics (2002-2004) Department of Physics, Guru Nanak Dev University, Amritsar, Punjab, India B.S. (Honors) Physics (1999-2002) Department of Physics, Guru Nanak Dev University, Amritsar, Punjab, India
Research Interests	Structure-property relationships in glasses; biomaterials, bioactive glasses, crystallization in glasses; glass-ceramics; nuclear waste management; optical fibers.
Teaching Assignments	▪ Fall semester (2014 – present) – Lab II - Materials characterization (UG; Credits: 2) ▪ Fall 2021 – Characterization of Materials (UG; Credits: 3) ▪ Spring 2015 – Mechanical Properties of Materials (UG; Credits: 3) ▪ Spring semester (2016 – present) – Advanced Glass (Graduate; Credits: 3)
Prizes/Awards	▪ 2023 Tadashi Kokubo Award, American Ceramic Society (Bioceramics Division) ▪ 2021 W.H. Zachariasen Award, Journal of Non-Crystalline Solids ▪ 2019 Acta Biomaterialia Outstanding Reviewer Award ▪ 2017 Vittorio Gottardi Prize, International Commission on Glass
Scholarship/Fellowships	▪ Postdoctoral Research Fellowship, FCT, Govt. of Portugal (2009) ▪ Ph.D. Fellowship, FCT, Govt. of Portugal (2007) ▪ Guest Scholarship for advanced research in Sweden (6 months) by Swedish Institute, Sweden (2007-2008). ▪ Research Fellowship, Department of Ceramics and Glass Engineering, CICECO, University of Aveiro, Portugal (2005)
Editorial Activities	▪ Associate Editor, Journal of the American Ceramic Society ▪ Associate Editor, International Journal of Applied Glass Science (The American Ceramic Society) ▪ Associate Editor, Frontiers in Materials- Glass Science (Nature Publishing Group) ▪ Associate Editor, Materials (MDPI Publishers) ▪ Associate Editor, Ceramics (MDPI Publishers) ▪ Editorial Board Member, Applied Sciences – Materials Section (MDPI Publishers)
Memberships of Committees/Societies	▪ Chairperson, TC05: Waste Vitrification, (2019-present) International Commission on Glass ▪ Chairperson, Bioceramics Division, (2021-2022) American Ceramic Society (ACerS) ▪ Member, TC04: Glasses in Healthcare, (2015-present) International

- Commission on Glass
- Member, Kreidl Award Selection Committee, 2015–2018, GOMD-ACerS
- Member, Alfred R. Cooper Young Scholar Award, 2017–2022, GOMD-ACerS

Conference/Symposia Organizer

Please refer to Annexure I

Presentations

Oral presentations: 11
Award Lectures: 2
Keynote Speaker: 3
Invited talks: 26
Posters: 1
Annexure II

Research Publications

International journals: 101 (Published: 108; In press/Accepted: 2; Submitted: 1)
Technical reports: 2
Conferences/Symposia: 11
Patents: 3; Patent Applications: 1
Annexure III

Citations/h-index

Citations: 4,350 (on Nov 9, 2024)
h-index: 40

Research Project(s)

PI/Co-PI on several federal and industry funded research projects.
Total amount of intra/extramural funds (since 2014): \$14.32M (Goel's share: \$7.36M)
Annexure IV

Advisor/Supervisor

Masters' thesis: 6 (5 Completed; 1 Ongoing)
Doctoral students: 12 (6 Completed; 6 Ongoing)
Postdoctoral Researchers: 11 (10 completed; 1 Ongoing)
Annexure V

Citizenship Status

Citizenship: USA

Conferences/Symposia organized

1. Symposium: Glasses and Optical Materials: Current Issues and Functional Applications, MS&T23: Materials Science & Technology, Columbus, OH, October 1-4, 2023.
2. Borates X – Phosphate III, Corning, NY, July 17-21, 2023
3. Session 2: Glass Crystallization and Glass-Ceramics, in Symposium 1: Fundamentals of Glassy State, Glass & Optical Materials Division Meeting (GOMD 2023), June 4-8, 2023, New Orleans, LA, USA.
4. 2022 Glass & Optical Materials Division Meeting of the American Ceramic Society, Baltimore, MD from May 22-26, 2022.
5. Potential Challenges in Bioceramics – From Fundamental Research to Clinical Translation, ACerS-MRS Bioceramics Virtual Workshop, April 7-8, 2021.
6. Session 8: Glass for Nuclear Waste Immobilization (TC05), 25th International Congress on Glass (ICG 2019), June 9 – 14, 2019, Boston, MA, USA
7. Symposium 2: Glasses in Healthcare – Fundamentals and Application, Glass & Optical Materials Division Meeting (GOMD 2018), May 20 - 24, 2018, San Antonio, Texas, USA.
8. T6. Ceramics and Glasses for Healthcare, 15th Conference & Exhibition of the European Ceramic Society, July 9 – 13, 2017, Budapest, Hungary.
9. Symposium 2: Glasses in Healthcare – Fundamentals and Application, 12th Pacific Rim Conference on Ceramic and Glass Technology (PACRIM 12), including Glass & Optical Materials Division Meeting (GOMD 2017), May 21 - 26, 2017, Waikoloa, Hawaii, USA.
10. Symposium 2: Glasses in Healthcare – Fundamentals and Application, Glass & Optical Materials Division (GOMD) Annual Meeting, The American Ceramic Society (Acers), May 22 - 26, 2016, Madison, WI, USA.
11. Session 4: Waste Immobilization – Waste Form Development: Processing and Performance, of Symposium 4: Glass Technology and Cross-Cutting Topics, Glass & Optical Materials Division (GOMD) Annual Meeting, The American Ceramic Society (Acers), May 22 - 26, 2016, Madison, WI, USA.

Presentations (45)

2024

1. **A. Goel**, Design of glasses for soft tissue engineering – Challenges and future research directions from the perspective of a materials scientist, 2024 Glass & Optical Materials Division (GOMD) Meeting, American Ceramic Society, Las Vegas, NV, May 19-22, 2024 (**Invited talk**).
2. **A. Goel**, Structural design of borosilicate-based nuclear waste glasses, ICG Spring School on Glass for a Sustainable Future, Lloret de Mar, Spain, April 29 – May 3, 2024 (**Invited talk**).

2023

3. **A. Goel**, Structural descriptors controlling sulfur solubility in borosilicate glasses, 2023 MS&T Technical Meeting and Exhibition, Columbus, OH, Oct 1-4, 2023 (**Invited talk**).
4. **A. Goel**, Decoding structural descriptors controlling nepheline ($\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$) crystallization in nuclear waste glasses, 2023 MS&T Technical Meeting and Exhibition, Columbus, OH, Oct 1-4, 2023 (**Invited talk**).
5. **A. Goel**, Design of glasses for soft tissue engineering – Challenges and future research directions from the perspective of a materials scientist, 2023 MS&T Technical Meeting and Exhibition, Columbus, OH, Oct 1-4, 2023 (**Tadashi Kokubo Award Lecture**).
6. **A. Goel**, P. Bingham, High level waste vitrification worldwide – Past, Present and Future, 3rd Summer School on Nuclear and Industrial Glasses for Energy Transition, Nimes, France, September 25-29, 2023 (**Invited talk**).
7. **A. Goel**, “Structural control of nepheline ($\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot \text{SiO}_2$) crystallization in functional glasses, XVIII Conference & Exhibition of the European Ceramic Society, Lyon, France, July 2-6, 2023 (**Keynote talk**).

2022

8. **A. Goel**, “Structural control of nepheline ($\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot \text{SiO}_2$) crystallization in functional glasses, International Webinar on multidimensional glass technologies, Indian Ceramic Society (Karnataka Chapter), December 16, 2022 (**Invited talk**).
9. **A. Goel**, “Challenges with vitrification of nuclear waste in the United States,” Lehman College, City University of New York (CUNY), Bronx, NY, October 19, 2022 (**Invited talk**).
10. **A. Goel**, X. Xu, R. Saini, R.E. Youngman, H. Eckert, D. Neuville, J.S. McCloy, “Structural descriptors controlling sulfur solubility in borosilicate glasses,” ACS Northeast Regional Meeting (NERM), October 2-5, 2022, Rochester, NY, USA (**Invited talk**).

11. **A. Goel**, “Challenges with vitrification of Hanford high level waste into borosilicate glass,” 2nd Conference on Energy Landscapes and Structure in Ion Conducting Solids (ELSICS), September 26-28, 2022, Göttingen, Germany (**Invited talk**).
12. **A. Goel**, “Challenges with vitrification of nuclear waste in the United States,” Alfred University, NY, September 15, 2022 (**Invited talk**).
13. **A. Goel**, X. Xu, R. Saini, R.E. Youngman, H. Eckert, D. Neuville, J.S. McCloy, “Structural descriptors controlling sulfur solubility in borosilicate glasses,” International Congress on Advances in Glass and Glass-Ceramics, August 23-25, 2022, Central Glass & Ceramic Research Institute, Kolkata, India (**Invited talk**).
14. **A. Goel**, X. Xu, R. Saini, R.E. Youngman, H. Eckert, D. Neuville, J.S. McCloy, “Structural descriptors controlling sulfur solubility in borosilicate glasses,” 26th International Congress on Glass, July 3-8, 2022, Berlin, Germany (**Invited talk**).
15. Panelist – Glass Art and Society, National Day of Glass, The American Ceramic Society, Washington DC, April 5-7, 2022. (**Invitation only**)

2021

16. **A. Goel**, “Design of boron-containing bioactive glasses – Challenges and Open questions,” Annual Conference of the Society of Biomaterials and Artificial Organs, India, December 17-20, 2021 (**Keynote Lecture**) – Online.

2020

17. **A. Goel**, “Design of boron-containing bioactive glasses – Challenges and Open questions,” 44th International Conference and Expo on Advanced Ceramics and Composites, January 26-31, 2020, Daytona Beach, FL, USA (**Invited talk**).

2019

18. **A. Goel**, “Arun Varshneya – A Guru, A mentor, a force to reckon with,” 25th International Congress on Glass, June 9-14, 2019, Boston, MA, USA (**Invited talk**).
19. **A. Goel**, J.S. McCloy, A. Kruger, “Challenges with vitrification of Hanford high level waste into borosilicate glass,” Innovations and Challenges in Radioactive Waste Management and Disposal (ICRWMD 2019), January 11-12, 2019, Bhabha Atomic Research Center, Mumbai, India (**Invited talk**).

2018

20. **A. Goel**, A. Deshkar, J.S. McCloy, “Compositional dependence of nepheline crystallization in high-level nuclear waste glasses,” 2018 MRS Fall Meeting, November 25-30, 2018, Boston, MA, USA (**Invited talk**).
21. **A. Goel**, “Structural design of third generation borosilicate based bioactive glasses,” MS&T18, October 14-18, 2018, Columbus, OH, USA (**Invited talk**).
22. **A. Goel**, S. Kapoor, N.J. Smith, R.E. Youngman, “Aqueous corrosion of alkali aluminoborate glasses,” MS&T18, October 14-18, 2018, Columbus, OH, USA (**Invited talk**).

23. **A. Goel**, “Turning nuclear waste to glass – Challenges and open questions,” ICG Annual Meeting 2018, September 23-26, 2018, Yokohama, Japan (**Vittorio Gottardi Award lecture**).
24. **A. Goel**, “Challenges with processing and performance of nuclear waste glasses, 20th University Glass Conference,” August 13-17, 2018, Penn State University, State College, PA (**Invited talk**).
25. **A. Goel**, J. McCloy, A. Kruger, “Challenges with processing and performance of high-level nuclear waste glasses: Past, Present, and Future,” 7th International Congress on Ceramics (ICC 7), June 17-21, 2018, Foz do Iguacu, Brazil (**Invited talk**).

2017

26. **A. Goel**, A. Brehault, D. Patil, R.E. Youngman, L. Thirion, J.C. Mauro, C.L. Corkhill, J.S. McCloy, “Compositional dependence of solubility/retention of molybdenum oxides in aluminoborosilicate based model nuclear waste glasses,” 12th Pacific Rim Conference on Ceramic and Glass Technology (PACRIM 12), including Glass & Optical Materials Division Annual Meeting (GOMD 2017), The American Ceramic Society (GOMD-ACers), May 21-26, 2017, Waikoloa, Hawaii, USA (**Oral Presentation**).

2016

27. **A. Goel**, A. Deshkar, Y. Shaharyar, J. Marcial, J.S. McCloy, “Structural and compositional dependence of crystallization in nepheline (NaAlSiO₄) based glasses,” MS&T 2016 Conference, Salt Lake City, UT, USA, October 23 – 27, 2016 (**Invited talk**).
28. **A. Goel**, “Glass – An unsung hero of the scientific revolution,” International Conference on Advanced Materials and Applications (ICAMA 2016), Bangalore, India, June 15-17, 2016 (**Keynote Speaker**).
29. **A. Goel**, A. Deshkar, J. Marcial, D.S. Bryce, L. Kobera, S. Southern, J.S. McCloy, “Structural dependence of crystallization in nepheline (NaAlSiO₄) based glasses: Impact of non-framework cation mixing,” Glass & Optical Materials Division Annual Meeting, The American Ceramic Society (GOMD-ACers) 2016, May 21-26, 2016, Madison, WI (**Oral Presentation**).

2015

30. **A. Goel**, S. Kapoor, A. Tilocca, H.-W. Kim, P.P. Cortez, A.F. Brito, A.F. Correia, L.M. Atayde, P. Dias-Perreira, A.C. Mauricio, A. Afonso, J.M.F. Ferreira, “Alkali-free bioactive glasses for bone tissue engineering,” Physics of Non-Crystalline Solids (PNCS XIV), Niagara Falls, NY, USA September 20-25, 2015 (**Invited talk**).
31. Y. Shaharyar, E. Han, J. Cheng, A. Maron, J.S. McCloy, **A. Goel**, “Understanding the influence of iron on crystallization kinetics of nepheline-based glasses,” WM2015 Symposia, March 15-19, 2015, Phoenix, AZ (**Poster presentation**).

2014

32. S. Kapoor, **A. Goel**, A.F. Correia, P.P. Cortez, L.M. Atayde, P.D. Pereira, A. Afonso, J.M.F. Ferreira, "Alkali-free bioactive glasses for bone regeneration, 12th New Jersey Symposium on Biomaterials Science," October 6-7, 2014, New Brunswick, NJ, USA **(Invited talk)**.

33. **A. Goel**, S. Kapoor, J.M.F. Ferreira, "Structure-solubility relationships in strontium- and zinc-doped bioactive glasses," Glass & Optical Materials Division Annual Meeting, 1st Joint Meeting of DGG - Acers GOMD, June 25-30, 2014, Aachen, Germany **(Oral presentation)**.

2013

34. **A. Goel**, J.M.F. Ferreira, "Alkali-free bioactive glasses for bone tissue engineering," Glass & Optical Materials Division Annual Meeting, The American Ceramic Society, June 2-7, 2013, San Diego, CA, USA **(Invited talk)**.

35. **A. Goel**, J.M.F. Ferreira, "Rare-earth containing glass-ceramic sealants for solid oxide fuel cells," Glass & Optical Materials Division Annual Meeting, The American Ceramic Society, June 2-7, 2013, San Diego, CA, USA **(Oral presentation)**.

36. **A. Goel**, Alkali/Alkaline-earth doped low-loss optical fibers – A review, Glass & Optical Materials Division Annual Meeting, The American Ceramic Society, June 2 - 7, 2013, San Diego, CA, USA **(Oral presentation)**.

2012

37. **A. Goel**, J.M.F. Ferreira, "Alkali-free bioactive glasses for bone tissue engineering," National Symposium on Materials and Processing (MAP-2012), Bhabha Atomic Research Centre (BARC), Mumbai, India, October 10-12, 2012 **(Invited talk)**.

38. **Guest Speaker** at 'Innovation in Science Pursuit for Inspired Research (INSPIRE)' programme sponsored and managed by the Department of Science and Technology, Govt. of India, August 2012 and December 2012. **(Invited talk)**

39. **A. Goel**, B.J. Riley, M. Liezers, C.F. Windisch Jr., J.S. McCloy, M.J. Schweiger, C.P. Rodriguez, P. Hrma, D.-S. Kim and A. Kruger, "Rhenium solubility in borosilicate nuclear waste glasses," 243rd ACS National Meeting and Exposition, San Diego, CA, USA, March 25-29, 2012 **(Invited talk)**.

2009

40. **A. Goel**, D.U. Tulyaganov and J.M.F. Ferreira, "Chemical interactions between alkaline-earth aluminosilicate glass-ceramic sealants and SOFC interconnect," International Symposium on Nanostructured Materials (ISNM 09), Jalandhar, India, October 28-29, 2009 **(Oral presentation)**.

41. **A. Goel**, D.U. Tulyaganov and J.M.F. Ferreira, "Chemical interaction between alkaline-earth aluminosilicate glass-ceramic sealants and interconnect materials for sealing applications in SOFC," 11th International Conference and Exhibition of European Ceramic Society, Krakow, Poland, June 21-25, 2009 **(Oral presentation)**.

2008

42. **A. Goel**, D.U. Tulyaganov and J.M.F. Ferreira, “Diopside based glass-ceramic sealants for solid oxide fuel cells, Instituto de Ceramica y Vidrio,” Madrid, Spain, 04. 12. 2008 **(Oral presentation)**.

43. **A. Goel**, D.U. Tulyaganov, S. Agathopoulos, and J.M.F. Ferreira, “Diopside-Ca-Tschermak based glass-ceramics for sealants in solid oxide fuel cells,” 9th ESG Conference with Annual Meetings of ICG and SGT, organized by Society of Glass Technology, held at City Congress Centre, Trenčín, Slovakia from June 22-26, 2008. **(Oral Presentation)**

2006

44. **A. Goel**, D.U. Tulyaganov, S. Agathopoulos, M.A. Karakassides and J.M.F. Ferreira, “Production and properties of MgSiO₃-containing glass-ceramics aiming for sealants in the technology of SOFC,” 8th ESG Conference with Annual Meetings of ICG and SGT, organized by Society of Glass Technology, held at University of Sunderland, UK from September 10-14, 2006 **(Oral Presentation)**.

2004

45. **A. Goel**, A. Arora, K. Singh, G. Sharma, “Fly Ash-Bismuth Borate Glasses as Radiation Shielding Materials,” International Symposium on Advanced Materials & Processing held at Indian Institute of Technology, Kharagpur, 6-8 December 2004 **(Oral Presentation)**.

List of patents and publications

Patents

1. **A. Goel**, A. Yadav, Hard and crack-resistant glass, US Provisional Application 63/266,339, filed on 01/03/2022.
2. **A. Goel**, Al₂O₃ rich hard and crack resistant glasses and glass-ceramics, US 11,434,164 B2, Sep 6, 2022
3. **A. Goel**, Al₂O₃ rich hard and crack resistant glasses and glass-ceramics, Chinese Patent No. ZL 2018800794375 – Patent granted on 06/01/2022.
4. **A. Goel**, J.M.F. Ferreira, Bioactive glass compositions, their applications and respective preparation methods, US 20140193499 A1.

Technical reports (2)

1. J.S. McCloy, B.J. Riley, **A. Goel**, M. Liezers, M.J. Schweiger, C.P. Rodriguez, P. Hrma, D.-S. Kim, W.W. Lukens, A.A. Kruger, Rhenium solubility in borosilicate nuclear waste glass: implications for the processing and immobilization of technetium-99, (PNNL-21553, Rev 0), 2012, Prepared for U.S. Department of Energy by Pacific Northwest National Laboratory, Richland, WA, 99354, USA.
2. **A. Goel**, Mechanical reliability of optical fibers, 2012, Sterlite Technologies Ltd., Aurangabad, Maharashtra, 431136, India.

Journal Articles (Total: 108; Published: 104; Accepted/In press: 3; Submitted: 1)

2024

1. H. Li, G. Demirok, S. Atilgan, I. Sokmen, Y. Zhang, A.M. Jose, A. Goel, New exploration of vibrational spectroscopic techniques: Probing structure, fictive temperature, and homogeneity of commercial glass and glass fiber, Int. J. Appl. Glass. Sci. (2024) Appl. Spectrosc. Pract. (2024) **Submitted**.
2. H. Li, G. Demirok, P. Ibarra-Munoz, Y. Zhang, I. Sökmen, B. Arslan, A. Jose, **A. Goel**, Effects of alternative natural silicates on the kinetics of batch-to-melt conversion for E-Glass fiber, Int. J. Appl. Glass Sci. (2024) **In press**.
3. P. Ferkl, P. Malviya, P. Hrma, A. Kruger, A. Goel, Modeling viscosity of commercial glass melts: Adam-Gibbs equation and gaussian process regression, J. Asian Ceram. Soc. (2024) **In press**.
4. J.S. McCloy, B.J. Riley, M.C.D. Wilkins, J.S. Evarts, J. Bussey, J.D. Vienna, P.A. Bingham, D.J. Gregg, M. Ojovan, S. Schuller, K. Uruga, D. Perret, E. Regnier, I. Giboire, W. Um, K. Xu, **A. Goel**, A.A. Kruger, International perspectives on glass waste form development for low-level and intermediate-level radioactive waste, Mater. Today (2024) **In press**.

5. A. Yadav, A. Rebecca, S. Kapoor, Y.-T. Shih, L. Huang, **A. Goel**, Structural design of a scalable glass with high hardness and indentation crack resistance, *Mater. Today* 78 (2024) 1-9.
6. Q. Qin, N. Stone-Weiss, N. Shi, P. Mukherjee, J. Ren, A. Goel, Synergy between Ca^{2+} and high ionic field-strength cations during the corrosion of alkali aluminoborosilicate glasses in hyper-alkaline media, *J. Am. Ceram. Soc.* 107 (2024) 7153-7174.
7. X. Xu, M. Bertani, R. Saini, S. Kamali, D.R. Neuville, R.E. Youngman, A. Pedone, **A. Goel**, Iron-induced structural rearrangements and their impact on sulfur solubility in borosilicate-based nuclear waste glasses, *J. Phys. Chem. C* 128 (2024) 11870-11887.
8. Y. Zhang, M. Bertani, A. Pedone, R.E. Youngman, G. Tricot, A. Kumar, **A. Goel**, Decoding crystallization behavior of aluminoborosilicate glasses: From structural descriptors to Quantitative Structure-Property Relationship (QSPR) based predictive models, *Acta Mater.* 268 (2024) 119784.

2023

9. T. Han, B. K. Aylas-Paredes, J. Huang, **A. Goel**, N. Neithalath, A. Kumar, On the prediction of the mechanical properties of limestone calcined clay cement: A random forest approach tailored to cement chemistry, *Minerals* 13 (2023) 1261.
10. T. Han, J. Huang, G. Sant, N. Neithalath, **A. Goel**, A. Kumar, Modeling hydration kinetics of sustainable cementitious binders using an advanced nucleation and growth approach, *Const. Build. Mater.* 404 (2023) 133327.
11. R. Saini, D.R. Neuville, R.E. Youngman, **A. Goel**, Deciphering the structural origins of high sulfur solubility in vanadium-containing borosilicate glasses, *J. Non-Cryst. Solids* 619 (2023) 122554.
12. A. Yadav, S. Chong, B.J. Riley, J.S. McCloy, **A. Goel**, Iodine capture by Ag-loaded solid sorbents followed by Ag recycling and iodine immobilization: An end-to-end process, *Ind. Engg. Chem. Res.* 62 (2023) 3635-3646.
13. X. Xu, R. Saini, E.K. Akdogan, J.S. McCloy, **A. Goel**, Corrosion behavior of Monofrax™ K-3 refractory in borosilicate-based model low activity waste glass melts, *J. Am. Ceram. Soc.* 106 (2023) 3375-3395.
14. Q. Qin, N. Stone-Weiss, T. Zhao, P. Mukherjee, J. Ren, J.C. Mauro, **A. Goel**, Insights into the mechanism and kinetics of dissolution of aluminoborosilicate glasses in acidic media: Impact of high ionic field strength cations, *Acta Mater.* 242 (2023) 118468.

2022

15. Y. Zhang, N. Balasubramanya, N. Stone-Weiss, S. Kamali, R.E. Youngman, P. Florian, **A. Goel**, Insights into the iron and phosphorus induced structural disorder in sodium aluminoborosilicate glasses and its impact on their melt rheology and crystallization behavior, *J. Phys. Chem C* 126 (2022) 21771-21792.

16. A. Deshkar, B. Parruzot, R.E. Youngman, O. Gulbitten, J.D. Vienna, **A. Goel**, Compositional dependence of crystallization and chemical durability in alkali aluminoborosilicate glasses, *J. Non-Cryst. Solids* 590 (2022) 121694.
 17. N. Balasubramanya, Z. Sun, M. Ahmadzadeh, S. Kamali, D.R. Neuville, J.S. McCloy, **A. Goel**, Impact of non-framework cation mixing on the structure and crystallization behavior of model high-level waste glasses, *J. Am. Ceram. Soc.* 105 (2022) 3967-3985.
 18. R. Saini, S. Kapoor, D.R. Neuville, R.E. Youngman, B. Cerrutti, J.S. McCloy, H. Eckert, **A. Goel**, Correlating sulfur solubility with short-to-intermediate-range ordering in the structure of borosilicate glasses, *J. Phys. Chem. C* 126 (2022) 655-674.
 19. P. Lu, S. Kapoor, L. Kobera, J. Brus, **A. Goel**, Structural dependence of crystallization in phosphorus-containing sodium aluminoborosilicate glasses, *J. Am. Ceram. Soc.* 105 (2022) 2556-2574.
- 2021**
20. X. Xu, J. Young, A. Goel, Impact of experimental protocols on the flexural strength testing of lithium disilicate-based dental glass-ceramics, *Tran. Ind. Ceram. Soc.* 80 (2021) 258-264.
 21. H. Kamat, F. Wang, K. Barnsley, J.V. Hanna, A.M. Tyryshkin, **A. Goel**, Insight into the partitioning and clustering mechanism of rare-earth cations in alkali aluminoborosilicate glasses, *Chem. Mater.* 33 (2021) 7944-7963.
 22. X. Xu, T. Han, J. Huang, A.A. Kruger, A. Kumar, **A. Goel**, Machine learning as a tool to accelerate the design of nuclear waste glasses with enhanced sulfur loadings, *ACS Appl. Mater. Interfaces* 13 (2021) 53375-53387.
 23. N. Stone-Weiss, N.J. Smith, R.E. Youngman, E.M. Pierce, **A. Goel**, Dissolution kinetics of a sodium borosilicate glass in Tris buffer solutions: Impact of Tris concentration and acid (HCl/HNO₃) identity, *Phys. Chem. Chem. Phys.* 23 (2021) 16165-16179.
 24. N. Stone-Weiss, H. Bradtmüller, H. Eckert, **A. Goel**, Composition–structure–solubility relationships in borosilicate glasses: Towards a rational design of bioactive glasses with controlled dissolution behavior, *ACS Appl. Mater. Interfaces* 13 (2021) 31495-31513.
 25. X. Xu, R.E. Youngman, S. Kapoor, **A. Goel**, Structural drivers controlling sulfur solubility in alkali aluminoborosilicate glasses, *J. Am. Ceram. Soc.* 104 (2021) 5030-5049.
 26. E.T. Nienhuis, N.J. Smith-Gray, G.N. Cocking, J. Marcial, Y. Zhang, M. Ahmadzadeh, **A. Goel**, J.S. McCloy, A comparative study on the effect of Zr, Sn, and Ti on the crystallization behavior of nepheline glass, *J. Non-Cryst. Solids* 569 (2021) 120970.
 27. P. Lu, Y. Zan, J. Ren, T. Zhao, K. Xu, **A. Goel**, Structure and crystallization behavior of phosphorus-containing sodium aluminosilicate glasses, *J. Non-Cryst. Solids* 560 (2021) 120719.

2020

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11. **A. Goel**, A. Arora, K. Singh, G. Sharma, Fly Ash-Bismuth Borate Glasses as Radiation Shielding Materials (2004), Proceedings of International Symposium on Advanced Materials & Processing held at Indian Institute of Technology, Kharagpur, 6-8 December 2004, pp. 1180-1189.

Annexure IV

Research Projects

Agency	Project Title	Total Funding Amount	Period of Performance	Collaborators (organization)
Rutgers TechAdvance	Phase II: Hard and crack-resistant glass	\$116,000 Role: PI	10/01/2024-09/30/2025	-
NJ Transit	Phase II: Proof-of-concept demonstration of the cleaning of polycarbonate windows from the NJ Transit trains	\$250,000 Role: PI	03/01/2024-02/28/2025	-
Corning Incorporated	Halides in multicomponent silicate glasses: From fundamental science to QSPR models	\$40,000 Role: PI	09/01/2023-08/31/2024	-
NJ Transit	Proof-of-concept demonstration of the cleaning of polycarbonate windows from the NJ Transit trains	\$48,065 Role: PI	02/21/2023-10/31/2023	-
Department of Defense	Dissolvable materials for photochemical tissue bonding, STTR-PHASE 1	\$75,000 (Role: University Partner)	05/01/2022 – 10/31/2022	Saxon Glass Technologies, Inc.
DOE, Office of River Protection	Glass research providing risk reduction for DF-LAW vitrification plant startup	\$2,172,757 (Role: PI)	01/01/2022 – 12/31/2025	
DOE, ARPA-E	Pioneering cermet waste form for disposal of waste streams from advanced reactors (PACE-FORWARD)	\$4,210,755 (Role: PI)	07/15/2022 – 07/14/2025	WSU; PNNL; SRNL; UofSC; Alfred U.; MS&T
National Science Foundation	Collaborative: Decoding the corrosion of borate glasses: From Fundamental Science to Quantitative Structure – Property Relationships	\$560,546 (Role: PI)	04/01/2021 – 03/31/2025	
TechAdvance Grant, Rutgers University	A “hard” and “crack-resistant” glass for functional applications	\$61,980 (Role: PI)	11/01/2020 – 10/31/2021	
DOE, Office of Nuclear Energy	Separated waste stream immobilization of iodine and off-gas caustic scrubber solution	\$400,000 (Role: Co-PI)	10/2020 – 09/2022	WSU, PNNL
DOE, Office of River Protection	Understanding the factors affecting the design and development of glasses formulated for direct feed vitrification of Hanford HLW and LAW	\$1,500,000 (Role: PI)	09/01/2018 – 08/31/2021	-
DOE, Office of Nuclear Energy	Understanding fundamental science governing the development and	\$3,000,000 (Role: PI)	10/01/2016 – 09/30/2020	WSU, PNNL, UNT

	performance of nuclear waste glasses			
National Science Foundation (NSF)	GOALI: Understanding composition – structure – chemical durability relationships in multicomponent oxide glasses: Influence of mixed network former effect	\$464,323 (Role: PI)	09/01/2015 – 08/31/2019	Corning
DOE, Office of River Protection	Understanding the impact of composition on crystallization and chemical durability of sodium and alumina-rich high level nuclear waste glasses in support of the DOE Waste Treatment and Immobilization Plant	\$920,000 (Role: PI)	09/15/2014 – 09/14/2019	-
Sterlite Technologies Ltd., India	Design and development of optical fibers with total losses <0.1 dB/km @ 1550 nm	\$150,000 (Role: PI)	01/01/2018 – 12/31/2018	-
GAIA, Rutgers Univ.	Structural design of third generation bioactive glasses	\$8,000 (Role: PI)	03/01/2017 – 12/31/2018	-
DOE, Office of Nuclear Energy, Nuclear Engineering University Program (NEUP)	Understanding influence of thermal history and glass chemistry on kinetics of phase separation and crystallization in borosilicate glass-ceramic waste forms for aqueous reprocessed high level waste	\$800,000 (Role: Co-PI) Rutgers: \$315,000	10/01/2015 – 09/30/2018	WSU, PNNL, Sheffield, Warwick
DOE, Office of Nuclear Energy, Nuclear Engineering University Program (NEUP)	Apatite and sodalite based glass-bonded waste forms for immobilization of ¹²⁹ I and mixed halide radioactive wastes	\$800,000 (Role: PI)	10/1/2014 – 9/30/2017	WSU, PNNL
PNNL	Travel award to APS, Argonne National Laboratory	\$5000 (Role: PI)	03/01/2017 – 06/30/2017	-
Corning Incorporated	Composition-structure-chemical durability relationships in phosphorus/boron containing oxide glasses	\$240,000 (Role: PI)	03/01/2015-02/28/2017	Corning
Army Research Lab (ARL)	Understanding the impact of chemical composition and molecular structure of oxide glasses on their mechanical properties	\$75,000 (Role: PI)	01/01/2015 – 12/31/2015	-

PI: Principal Investigator; **Alfred U:** Alfred University; **MS&T:** Missouri University of Science & Technology; **PNNL:** Pacific Northwest National Laboratory, Richland, WA; **Sheffield:** The University of Sheffield, UK; **SRNL:** Savannah River National Laboratory; **UofSC:** University of South Carolina; **Warwick:** University of Warwick, UK; **WSU:** Washington State Univ. Pullman, WA.

Annexure V

M.S./Ph.D. Students

Name of student	Degree	Thesis title	Status
Lavleen Saini	Ph.D.	TBD	Ongoing (Sept 2024 – Present)
Faye Nourollahi	Ph.D.	Phosphate glasses	Ongoing (Sept 2023 – Present)
Preeti Malviya	Ph.D.	Rheology and crystallization behavior of borosilicate glasses	Ongoing (Jan 2023 – Present)
Ammar Ishaq	M.S.	Cermets for immobilization of waste from advanced reactors	Ongoing (Jan 2023 – Present)
Femi Ademuwagun	Ph.D.	Phosphate glasses for soft tissue engineering	Ongoing (Jan 2023 – Present)
Ann Mary Jose	Ph.D.	Glass Corrosion	Ongoing (Sept 2022 – Present)
Nedgine Joseph	Ph.D.	Solubility of oxyanions in borosilicate glasses	Ongoing (Sept 2022 – Present)
Qianhui Qin	Ph.D.	Impact of high field strength cations on the dissolution behavior of aluminoborosilicate glasses	Ongoing (Jan 2019 – Present)
Yingcheng Zhang	Ph.D.	Nepheline crystallization in nuclear waste glasses	Completed (May 2023)
Rokia Tamraz	M.S.	Impact of mixed alkaline earth effect on the dissolution behavior of borate glasses	Completed (January 2023)
Nikhila Balasubramanya	Ph.D.	Crystal tolerant high-level nuclear waste glasses	Completed (August 2022)
Xinyi Xu	Ph.D.	Sulfur tolerant low activity waste glasses	Completed (July 2022)
Hrishikesh Kamat	Ph.D.	Rare-earth oxides in aluminoborosilicate glasses and their impact on molybdenum solubility in nuclear waste glasses	Completed (May 2021)
Zhenxuan Sun	M.S.	Effect of non-framework cation mixing on spinel crystallization in high-level waste glasses	Completed (November 2020)
Nicholas Stone-Weiss	Ph.D.	Composition–structure–chemical durability relationships in multicomponent silicate glasses	Completed (April 2020)
Ambar Deshkar	Ph.D.	Crystallization behavior of sodium- and alumina- rich simplified high-level nuclear waste glasses	Completed (August 2019)
Anne Rebecca	M.S.	Al ₂ O ₃ -rich glasses and glass-ceramics	Completed (December 2018)
Charlie Cao	M.S.	Glass-bonded ceramic waste forms for immobilization of Iodine-129	Completed (December 2016)
Yaqoot Shaharyar	M.S.	Structure-solubility relationships in fluoride-containing phosphate glasses	Completed (March 2015)
Saurabh Kapoor	Ph.D.	Bioactive glasses for bone regeneration	Completed (December 2014)

Postdoctoral Researchers

Dr. Rajan Saini	Sept 2023 – Present
Dr. Anjali Yadav	Oct 2020 – May 2022
Dr. Rajan Saini	Aug 2018 – July 2021
Dr. Hien-Yoong Hah	Nov 2018 – Dec 2019
Dr. Fu Wang	Dec 2017 – Nov 2018
Dr. Saurabh Kapoor	June 2017 – Dec 2018
Dr. Mohamed Naji	Jan 2017 – Dec 2017
Dr. Lu Ping	Nov 2016 – Oct 2017
Dr. Pradeesh Kannan	July 2016 – July 2017
Dr. Antoine Bréhault	Feb 2016 – Feb 2017
Dr. Prashant Dabas	July 2015 – May 2016
