



# Exponent®

Engineering & Scientific Consulting

## Chris White, Ph.D.

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## Professional Profile

Dr. White assists clients by solving technical problems related to the specification, reliability and sustainability of polymeric materials used in a variety of industries including construction, infrastructure, transportation, chemicals and utilities. One of Dr. White's core competencies is characterizing weather-related changes to the chemical and physical properties of polymers and how those degradative changes may affect end-use performance.

This expertise enables him to provide solutions to complex issues related to assessing durability, failure, sustainability, and climate change effects on materials and assets exposed to weathering. He is skilled in developing and utilizing test methods and standards to analyze plastics, rubbers, textiles, metals, glass, and ceramic composite materials. Dr. White is skilled in offering technical guidance throughout all phases of product development including formulation, scale-up, end-use testing and field performance assessments.

Dr. White has extensive knowledge of various polymer characterization (i.e., physical, mechanical, and chemical), analytical and rheological methods (e.g., linear viscoelastic, non-linear, plastic, viscoplastic, rubber modulus, and adhesion). He has researched the areas of fundamental polymer physics; plastic packaging and barrier materials; paints and coatings; plastic pipes; spray foam insulation; adhesives; nanoparticle release; and sealants; additive manufacturing/3D printing; composite materials; rubber gaskets and seals; fibers and textiles; polymer chemical resistance; wire and cable insulation; environmental effects on durability; and product aging.

This expertise enables Dr. White to solve problems in a wide variety of areas: building components including building envelope, material selection, and flame retardants; life prediction and fitness for service, paints, and coatings; and risk mitigation and hazard analysis of consumer products, defense, transportation, buildings and structures, paints and coatings, pipelines, and electrical utilities.

Before joining Exponent, Dr. White was a research chemist at the National Institute of Standards and Technology. His research focused on developing new test methods that assess the durability of polymers exposed to weathering. He also worked on projects related to the adhesion of spray-applied fireproofing, blast resistance of trash containers, and material selection for building envelopes. Additionally, Dr. White's has also led multidisciplinary teams focused on sustainability, climate change impacts, enterprise risk management, and community resilience. He was also a credentialed member of the National Construction Safety Team. Dr. White is a fellow of ASTM International, served as an elected Chair of ASTM C24 and voting member of eight other ASTM technical committees, Building Seals and Sealants, and an elected officer of the Society of Rheology.

## Academic Credentials & Professional Honors

M.B.A., Business Administration, University of Maryland, College Park, 2007

Ph.D., Chemistry, University of Wisconsin, Madison, 1994

B.A., Chemistry, Wabash College, 1986

ASTM Award of Merit

Elected to Fellow of ASTM

Appointed to United Nations, Ozone Secretariat on the Environmental Effects Assessment Panel

ASTM Lou Toporer Hall of Fame Award

Department of Commerce, Bronze metal

National Research Council Postdoctoral Fellowship

Sigma Xi, Research Honor Society

Phi Lambda Upsilon, Chemical Honor Society

Beta Gamma Sigma, Business Honor Society

## Academic Appointments

Lecturer/Adjunct Professor, University of Maryland/Smith School of Business 2007-2015

## Prior Experience

2018-Present United Nations, Ozone Secretariat on the Environmental Effects Assessment Panel

Research Chemist, NIST, 1997-2020

## Professional Affiliations

ASTM

Society of Rheology

Adhesion Society

American Chemical Society

Society of Plastics Engineering

## Publications

### Books

Durability of Building and Construction Sealants and Adhesives: 7th Volume, White, C. and Miyauchi, H., Eds., STP1633-EB, ASTM International, West Conshohocken, PA, 2022, <https://doi.org/10.1520/STP1633-EB>

Service Life Prediction of Polymers and Coatings: Enhanced Methods, White, C. M. Nichols, and J. Pickett, Elsevier, 340 pages. 2020

Durability of Building and Construction Sealants and Adhesives: 6th Volume, White, C. and Miyauchi, H., Eds., STP1604-EB, ASTM International, West Conshohocken, PA, 2018, <https://doi.org/10.1520/STP1604-EB>

Service Life Prediction of Polymers and Plastics Exposed to Outdoor Weathering, Editors: Christopher C. White Kenneth M. White James E. Pickett, Elsevier, 2017, 342 pages, ISBN: 9780323497763

Service Life Prediction of Exterior Plastics, Vision for the Future, , Editors: Christopher C. White, Jon Martin ,J. Thomas Chapin, Springer, 2015, 252 pages. IBSN: 978-3-319-06033-0.

### **Book Chapters**

Forster A., Christopher C. , Dillard D., Standard Test Methods and Their Need to Evolve, Ch 14 p 459-493, in , Advances in Structural Adhesive Bonding 2nd edition, D.A. Dillard (Ed.), Woodhead, Cambridge, UK (2023), [doi.org/10.1016/B978-0-323-91214-3.00031-4](https://doi.org/10.1016/B978-0-323-91214-3.00031-4)

Scott W. Case, Arit Das, Michael J. Bortner,, David A. Dillardb, and Christopher C. White, Durability and Accelerated Characterization of Ahdesive Bonds, P 675-711 in , Advances in Structural Adhesive Bonding 2nd edition, D.A. Dillard (Ed.), Woodhead, Cambridge, UK (2023), [doi.org/10.1016/B978-0-323-91214-3.00031-4](https://doi.org/10.1016/B978-0-323-91214-3.00031-4)

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Pintar, Adam, White, Christopher, and Sung, LiPiin, Building Hierarchical Bayesian Models for Sealant Data from the NIST Solar Sphere in, Service Life Prediction of Polymers and Coatings: Enhanced Methods, White, C. M. Nichols, and J. Pickett, Elsevier, 340 pages. 2020

White, Christopher C.; Hunston, Donald L.; Accelerated Testing: Challenges and Opportunities., In Natural and Artificial aging of Polymers, Gesellschaft Fur Umweltsimulation Ev GUS, Pfinztal, Germany, , 2017

White, Christopher, Hunston, Donald, Pintar, Adam, Filliben, James, Designing an Accelerated Test Method to Determine the Design Life of Building Joint Sealant using the ASTM C1850 Procedure, in STP1604 on Sixth Symposium on the Durability of Building and Construction Sealants and Adhesives, 2018.]

White, Christopher C.; White, Kenneth M. ; Pickett, James, Service Life Prediction -Why is this so hard?; in Service Life Prediction of Polymers and Plastics Exposed to Outdoor Weathering, Editors: Christopher C. White Kenneth M. White James E. Pickett, Elsevier, 2017, 342 pages, ISBN: 9780323497763.

White, Christopher C.; Hunston, Donald L.; Tan, Kar Tean;., Applied Strain on Sealant Samples Exposed to Outdoor Weather, In Natural and Artificial aging of Polymers, Gesellschaft Fur Umweltsimulation Ev GUS, Pfinztal, Germany, p 75-90, 2015.

C. C. White, T. K. Tan, L. D. Hunston, A. Pintar, and J. Filliben, "Progress in the Development of a Method to Predict Sealant Modulus Change Due to Outdoor Weathering," in Durability of Building and Construction Sealants and Adhesives: 5th Volume, ed. L. Carbary and A. Wolf (West Conshohocken, PA: ASTM International, 2015), 142-149. <https://doi.org/10.1520/STP158320140054>

White, Christopher C.; Tan, Kar T.; Hunston, Donald L.; Forster, Aaron M.; Jacobs, Deborah; Impact of

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C.C. White, K.T. Tan, A.T. Wolf, and L.D. Carbary, Advances in Silicone Adhesives, in: Advances in Structural Adhesive Bonding, D.A. Dillard (Ed.), Woodhead, Cambridge, UK (2010), pp. 66-95.

K.T. Tan, C.C. White, D.L. Hunston, B.D. Vogt and A.P. Haag, Improving and assessing bonding in wet conditions, in: Advances in Structural Adhesive Bonding, D.A. Dillard (Ed.), Woodhead, Cambridge, UK (2010), pp.547-568.

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K.T. Tan, C.C. White, D.J. Benatti, D. Stanley and D.L. Hunston, Chemorheological investigation on the environmental susceptibility of sealants, in: Handbook of Sealants Technology, K.L. Mittal and A. Pizzi (Eds.), Marcel Dekker, NY, in press.

C.C. White, L. Carbary, and A.T. Wolf, Advances in silicone adhesives, in: Advances in Structural Adhesive Bonding, D. Dillard (Ed.) 2008.

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Williams, R S, S. Lacher, C. Halpin, White, C C, "Evaluating Weather Factors and Material Response During Outdoor Exposure to Determine Accelerated Test Protocols for Predicting Service Life", Proceedings of the 3rd International Symposium on Service Life Prediction, Federation of Societies for Coatings Technology. 2005. p.171-87

S. Lacher, Williams, R S, , C. Halpin, White, C C, "Development of a Powered Outdoor Sealant Fatigue Test Apparatus", Proceedings of the 3rd International Symposium on Service Life Prediction, Federation of Societies for Coatings Technology. 2005. p.207-217

Thomas, W. C., C. C. White, and M. R. VanLandingham., "Moisture Diffusion and Temperature History Models for Thin Organic Coatings Exposed to Ambient Air," Proceedings of the 3rd International Symposium on Service Life Prediction, Federation of Societies for Coatings Technology. 2005. p.187-207

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Fairbrother, Andrew; Hsueh, Hsiang C. ; Kim, Jae Hyun; Jacobs, Deborah; Perry, Lakesha N. ; Goodwin Jr., David; White, Christopher C.; Watson, Stephanie S.; Sung, Li Piin, Temperature and light intensity effects on the photodegradation of high-density polyethylene, *Polymer Degradation and Stability*,165, July 2019 (153-160).

Tsai, B.K. B. K. Tsai, C. C. Cooksey, D. W. Allen, C. C. White, E. Byrd and D. Jacobs, Exposure study on UV-induced degradation of PTFE and ceramic optical diffusers. *Applied Optics*, 2019. 58(5): p. 1215-1222.

Kazi Sadman , Clinton G. Wiener, R. A. Weiss , Christopher C. White, Kenneth R. Shull , and Bryan D. Vogt, Quantitative Rheometry of Thin Soft Materials Using the Quartz Crystal Microbalance with Dissipation, *Anal. Chem.*, 2018, 90 (6), pp 4079–4088

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Christopher White,\* Kar Tean Tan, Donald Hunston, Kristen Steffens, Deborah L. Stanley, Sushil K. Satija, Bulent Akgun and Bryan D. Vogt\*, Mechanisms of criticality in environmental adhesion loss, *Soft Matter*, 2015,11, 3994-4001

White, Christopher C.; Hunston, Donald L.; Tan, Kar T. ; Hettenhouser, John W.; Garver, Jason D., An accelerated exposure and testing apparatus for building joint sealants, Review of Scientific Instruments, 84(9), 2013

White C.C. Hunston, D.L. and Tan, K.T., Filliben, J.J., A systematic approach to the study of accelerated weathering in building joint sealants, Journal of ASTM International, Vol 9(5). May 2012, 17 pages.

Thomas, W.C., White, C.C., Byrd, W.E., Transitory Temperatures of Organic-Film Coated Specimens under Outdoor Exposure, Polymer Degradation and Stability, Vol 97(3) March 2012, p421-429

White C.C. Hunston, D.L. and Tan, K.T., A test method for monitoring changes during durability tests on building joint sealants, Journal of ASTM International, Vol 9(2) February 2012, 8 pages

C.C. White, W.E. Byrd, and W.C. Thomas, Transient temperature of polymeric film coated specimens under outdoor exposure, Polymer Degradation and Stability, 96 (4) 1492-1501 (2011)

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C.C. White, K.T. Tan, E.P. O'Brien, D.L. Hunston, and J.W. Chin, Design, fabrication and implementation of a thermally driven outdoor testing devices for building joint sealants, Review of Scientific Instrument, 82, 025112 (2011).

C.C. White, K.T. Tan, D.L. Hunston, T. Nguyen, D.J. Benatti, D. Stanley and J.W. Chin, Indoor accelerated and outdoor field weathering of styrene-ethylene-butadiene-styrene block copolymer: acceleration and correlation, Polymer Degradation and Stability, 96 (6), 1104-1110 (2011).

K.T. Tan, C.C. White, and D.L. Hunston, An adhesion test method for spray-applied fire resistive materials. Fire and Materials, 35 (4), 245-259 (2011).

C.C. White, "Studies on the Effect of Movement During the Cure on the Mechanical Properties of Building Joint Sealant," Polymer Engineering and Science, Polymer Engineering and Science, 50, 113-119 (2010).

K.T. Tan, C.C. White, D.J. Benatti and D.L. Hunston, Effects of ultraviolet radiation, temperature, and moisture on aging of coatings and sealants: A chemical and rheological study, Polymer Degradation and Stability, 95 (9), 1551-1556 (2010).

D.P. Bentz, C.C. White, K.R. Prasad, D.R. Flynn, D.L. Hunston and K.T. Tan, A materials science-based approach to characterizing fire resistive materials, in: Advances in State of the Art of Fire Testing, A.J. Parker (Ed.), ASTM STP 1517, ASTM International, West Conshohocken, Philadelphia, 199-210 (2010).

C.C. White, K.T. Tan, D.J. Benatti, D. Stanley, D.L. Hunston and J.W. Chin, Laboratory accelerated and natural weathering of styrene-butylene-styrene (SEBS) block copolymer, Polymer Degradation and Stability, (96) 2011 1104-1110..

C.C. White, K.T. Tan, E.P. O'Brien, D.L. Hunston and J.W. Chin, Design and development of a thermally-driven outdoor testing device for building joint sealants, Review of Scientific Instrument, 2011. 82(2)..

C.C. White, D. Hunston and K.T. Tan, Does imposed strain affect modulus change in sealant subjected to outdoor weathering, Journal of ASTM International, 2009

White, C.C., D.L. Hunston, and R.S. Williams, Studies on the Effect of Movement During the Cure on the Mechanical Properties of a Silicone Building Joint Sealant. Polymer Engineering and Science, 2010. 50(1): p. 113-119.

Bentz, D, White, Christopher, Learning How to Better Protect Steel at High Temperatures: NIST Develops New Ways of Testing and Measuring Fire-Resistive Materials, Modern Steel Construction, October, (2009) p12-15.

C.C. White and D.L. Hunston, Characterizing the Non-Linear Viscoelastic Properties of Sealant including the Mullins Effect, Polymer Engineering and Science, Polymer Engineering & Science, Volume 48, Issue 12, Dec.2008, Pages- 2317-2328.

Tan KT, Vogt BD, White CC, Steffens KL, Goldman J, Satija SK, Clerici C, Hunston DL, On the origins of sudden adhesion loss at a critical relative humidity: Examination of bulk and interfacial contributions, Langmuir, Volume: 24 Issue: 17 Pages: 9189-9193 SEP 2 2008

Tan KT, White CC, Hunston DL, Clerici C, Steffens KL, Goldman J, Vogt BD, Fundamentals of adhesion failure for a model adhesive (PMMA/Glass) joint in humid environments, Journal of Adhesion, Volume: 84 Issue: 4 Pages: 339-367 2008

Tan KT, White CC, Benatti DJ, Hunston DL, Evaluating aging of coatings and sealants: Mechanisms, Polymer Degradation and Stability, Volume: 93 Issue: 3 Pages: 648-656, MAR 2008

O'Brien EP, White CC, Vogt BD Correlating interfacial moisture content and adhesive fracture energy of polymer coatings on different surfaces, Advanced Engineering Materials, Volume: 8 Issue: 1-2 Pages: 114-118, FEB 2006

C. White, M. R. VanLandingham N.-K. Chang, H.-Y. Ho and S.-H. Chang, "Viscoelastic Characterization of Polymers Using Instrumented Indentation – II. Dynamic Testing," Journal of Polymer Science Part B: Polymer Physics Volume 43, Issue 14, Date: 15 July 2005, Pages: 1812-1824

M. R. VanLandingham, N.-K. Chang, C. C. White, and S.-H. Chang, "Viscoelastic Characterization of Polymers Using Instrumented Indentation – I. Quasi-static Testing," Journal of Polymer Science Part B: Polymer Physics, Volume 43, Issue 14, Date: 15 July 2005, Pages: 1794-1811

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C. White, N. Embree, C. Buch, and R. S. Williams Design, development, and testing of a hybrid in situ testing device for building joint sealant, Rev. Sci. Instrum. 76, 045111 (2005)

White, C C ; Embree, E ; Patel, A M ; Byrd, E, Development of a High Throughput Method Incorporating Multiple Traditional Analytical Devices, J. Res. Natl. Inst. Stand. Technol. 109, 465-477 (2004) (COVER)

Vogt BD, Lin EK, Wu WL, White CC, Effect of film thickness on the validity of the Sauerbrey equation for hydrated polyelectrolyte films, Journal of Physical Chemistry B, Volume: 108 Issue: 34 Pages: 12685-12690 Published: AUG 26 2004

C.C. White, W-L Wu, Y. Pu, M. Rafailovich, and J. Sokolov, Probe Segregation and T<sub>g</sub> determination of an Ultra-Thin Polystyrene Film on Quartz Studied by X-ray and Neutron Reflectivity, and SIMS. Polymer Engineering and Science, 43(6) 1241-1249, 2003

Y. Pu, H. White, M. Rafailovich, J. Sokolov, A. Patel, C.C. White, W-L Wu, Zaitsev V, S. Schwarz, Probe Diffusion in thin PS Free-standing films, Macromolecules 34:(24) 8518-8522, 2001

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Dependence of the glass transition temperature of polymer films on interfacial energy and thickness, *MACROMOLECULES* 34: (16) 5627-5634 JUL 31 2001

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White CC, Wagenblast J, Shaw MT, Separation, size reduction, and processing of XLPE from electrical transmission and distribution cable, *POLYM ENG SCI* 40: (4) 863-879 APR 2000

White CC, Schrag JL, Theoretical predictions for the mechanical response of a model quartz crystal microbalance to two viscoelastic media: A thin sample layer and surrounding bath medium, *J CHEM PHYS* 111: (24) 11192-11206 DEC 22 1999

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### **Publications (non-refereed)**

Hunston, Donald L.; White, Christopher C.; A Kinetics Based Models for Environmentally Induced Sealant Degradation, Proceedings of the 37th Annual Meeting of the Adhesion Society, St. Petersburg, FL. 2017

White, Christopher C.; Hunston, Donald L.; Tan, Kar T, Aging of Polymeric Films used in Protective Glazing Systems, Proceedings of the 36th Annual Meeting of the Adhesion Society, New Orleans, LA. 2015

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C.C White, K. T. Tan, D.L. Hunston, and, G.T. Schueneman, The Role of Service Life Prediction of Adhesive and Sealant Materials in Sustainability Determinations, Proceedings of the 34rd Annual Meeting of the Adhesion Society, Inc., Feb. 21-24, 2011, G. Anderson (Ed.), pp. 186-188, Savannah, Ga..

Gregory T. Schueneman\*, Steven Lacher\*, Christopher G. Hunt\*, Christopher C. White†, and Donald L. Hunston Durability of Sealants Exposed to Outdoor Weathering and Hot Compression Cycles. Proceedings of the 34rd Annual Meeting of the Adhesion Society, Inc., Feb. 21-24, 2011, G. Anderson (Ed.), pp. 186-188, Savannah, Ga.

D.L. Hunston, K.T. Tan, B.D. Vogt, S.K. Satija, C. Clerici and C.C. White, Little things mean a lot: Water and the adhesive bond, Proceedings of the 33rd Annual Meeting of the Adhesion Society, Inc., Feb. 21-24, 2010, G. Anderson (Ed.), pp. 4-6 Daytona Beach, FL.



K.T. Tan, C.C. White, D.L. Hunston, K. Steffens, T. Hatlee, K. Hamilton, B.D. Vogt and J.W. Chin, Roles of adhesive and interfacial properties on humidity-induced failure, Proceedings of the 33rd Annual Meeting of the Adhesion Society, Inc., Feb. 21-24, 2010, G. Anderson (Ed.), pp. 186-188, Daytona Beach, FL.

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C.C. White, K.T. Tan and D.L. Hunston, Effects of strain on the long term rheology of filled viscoelastic solids, AIP Conference Proceedings Vol. 1027, the XVth International Congress on Rheology, Aug. 3-8, 2008, Monterey, CA, pp. 1342-1344.

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C.C. White, D.L. Hunston and K.T. Tan, Effect of strain on durability of model elastomers, Proceedings of the 233th ACS Annual Meeting, March 25-29, 2007, Chicago, IL.

C.C. White, D. L. Hunston, K. T. Tan, Predicting the In-Service Performance of Sealant, A Surprisingly Complicated Problem, Proceedings of the World Adhesive Conference, April 2008, Miami.

K.T. Tan, C.C. White, J. Goldman, D.L. Hunston and B. Vogt, Mechanisms of adhesion loss at and above critical relative humidity, Proceedings of the 30th Annual Meeting of the Adhesion Society, Inc., February 19-22, 2007, Tampa, FL, G. Anderson (Ed.), pp.160-162.

C.C. White, K.T. Tan and D.L. Hunston, Progress in developing an adhesion test method for fire protective materials, Proceedings of the 30th Annual Meeting of the Adhesion Society, Inc., February 19-22, 2007, Tampa, FL, G. Anderson (Ed.), pp. 459-460.

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P. L. Drzal, A. M. Forster, C. Rand, A. J. Crosby, C. C. White, and M. R. VanLandingham Instrumented Indentation of Model Soft Elastomers and Adhesion Effects, Proceedings of the 28th Annual Meeting of the Adhesion Society

E.P. O'Brien and Christopher White, Comparison of Subcritical Adhesion Test Methods: the Shaft-Loaded Blister Test vs the Wedge Test, Proceedings of the 28th Annual Meeting of the Adhesion Society

C. C. White, P. L. Drzal, and M. R. VanLandingham, Viscoelastic Characterization of Polymers Using Dynamic Instrumented Indentation, Proceedings of the Materials Research Society, Boston, MA December 2004.

M. R. VanLandingham, C. C. White and P. L. Drzal, Indentation Creep and Relaxation Measurements of Polymers, Proceedings of the Materials Research Society, Boston, MA December 2004.

C. C. White, P. L. Drzal, and M. R. VanLandingham, Can the Nanoindenter Become a Rheological Tool, Proceedings of the Society of Plastics Engineering, Annual Technical Conference, Boston, Ma 2005

C. C. White, D.L. Hunston, The Effect of Movement During Cure of a Silicone Sealant, ANTEC conference from Society of Plastics Engineering, Chicago, IL,

Dodder, N. G. Stapleton, H. M. White, C. C. Davis, R. D. Nyden, M. R. Measurements of the Photolytic Breakdown of Decabromodiphenyl Ether in Plastics, 15 Annual BCC Conference on Flame Retardancy, Stanford, CT, June 04.

C. C. White, D.L. Hunston, "The Effect of Movement During Cure of a Silicone Sealant", Proceedings of the ANTEC conference from Society of Plastics Engineering, Chicago, IL, 5/2004.

C.C. White and D.L. Hunston, "Studies on the Effect of Movement During the Cure on the Mechanical Properties of Sealant, Proceeding of the 27th Annual Meeting of the Adhesion Society, Wilmington NC, 2/2004

D. L. Hunston, and C. C. White, "Viscoelastic Characterization of Sealant Materials," Proceeding of the 26th Annual Meeting of the Adhesion Society, Myrtle Beach, SC, 2/2003.

C.C. White and D.L. Hunston, "Challenges in Characterizing Sealant," Proceedings of the ANTEC conference from Society of Plastics Engineering, Nashville, TN, 5/2003

D. L. Hunston, C. C. White, "Mechanical Behavior of Caulks and Sealants" Proceedings from the 225th ACS National Meeting, New Orleans, LA 3/2003

C. C. White, J. Martin, S. Weber, L. Shultz, Reliability-Based Method for Service Life Prediction of Materials, SPE/ANTEC proceedings, May 02.

C. Williams, R S, White, C C, "Merging Weather Data With Materials Response Data During Outdoor Exposure, Proceedings of the 3rd International Woodcoatings Congress The Hague, October 2002

White, C. Buch, M.R. Vanlandingham "Development of a Reliability-Based Method of Service Life Prediction for Sealant" in Proceedings of the 25th Annual Meeting of the Adhesion Society, p 420-422.

C.C. White, Research on Sealant at the National Institute of Standards and Technology: Past and Present, Proceedings of the Adhesion Society, Williamsburg, Va, 2001

M.R. Vanlandingham, C.C. White, and X. Gu, "Nanomechanical Measurements of Polymeric Systems", in Proceedings of the 25th Annual Meeting of the Adhesion Society, p 472-474, 2002

C.C. White, Focus on Durability, PATH Research at the National Institute of Standards and Technology, proceedings of the PATH-D conference, Madison, WI, Nov 2000

C.C. White, "Stress Test: A Reliability-Based Method for Predicting the Service Life of Sealants", Adhesives Age, 2000.

C.C. White, Service Life Prediction of Sealant, Proceedings of the Adhesives and Sealant Council Annual Meeting, Las Vegas, 2000

White, C C, Wu, W L, "Studies of the Polymer Thin Film Glass Transition Temperature Monitored With the Complex Viscoelastic Coefficients", Proceedings of the Materials Research Society, San Francisco, Ca, 1999.

White, C C, Wu, W L, "A Novel Method to Determine the Mechanical Properties of Ultra-Thin Films", Proceedings of the Materials Research Society, Boston, Ma, 1998.

Wallace, W E, White, C C, Wu, W L, "Measurement of Thin Film Thermomechanical Properties for Polymer Interlayer Dielectric Optimization", Characterization and Metrology for ULSI Technology, Gaithersburg, MD 1999.

C.C. White, J. Wagenblast, and M.T. Shaw, "Reusing XLPE from Electrical Cable Waste: Cable Separation, Processing and Blend Properties." ANTEC '99 Proceedings.

E. D. Bliznakov, C.C. White, M.T. Shaw, "Improving the Mechanical Properties of Blends of Recycled HDPE and Urea-Formaldehyde Resin. ANTEC 98 Conference Proceedings, Volume 3, p 2921-24.

C.C. White, B. Schwegler, and M. T. Shaw, Studies on the Use of Granular Post-Industrial Thermoset Fillers on the Tensile Properties of Thermoplastic Resins, AIChE Proceedings, Chicago, November, 1996.

C.C. White and M.T. Shaw, Studies of the Effect of Specific Chemical Interactions between Particle and Fluid on Newtonian Suspension Rheology in a Filled Polyester Styrene System, ANTEC Proceedings 1996.

C.C. White and J.L. Schrag, "Continuing Studies of Solvent Modification by Polymer in Dilute Solution.", Polymer Preprints, 35(1), p 429-430, 1994.

T.M. Stokich, P.A. Merchak, D.R. Radtke, C.C. White, G.R. Woltman and J.L. Schrag, "Experimentally Determined Polymer and Solvating Environment Contributions to the Viscoelastic Properties of Dilute Polymer Solutions." Polymer Preprints, 35(1), p 138-139, 1994.

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### **Invited Presentation**

White, Christopher, Plastics and Recyclability Claims, 2023 Environmental & Energy, Mass Torts, and Products Liability Litigation Committees' Joint Regional CLE Program, , Feb 2023, Vail Co.

White, Christopher, Tunable Plastic Durability: Potential Solutions to Accumulating Post-Use Plastic, SPE ANTEC Denver Co. March 2023

White, Christopher, Measuring Durability, Why is this so difficult? Caulks and Sealants Short Course, ASC conference, New Orleans, 2023

White Christopher, Benjamin Streifel, The changing landscape of plastic waste, are you ready? Foam and Adhesives & Bonding Expo 2023, Nuvi, Mi

White Christopher, Environmental, Social, Governance (ESG) considerations for Adhesives and Sealant Formulations, World Congress of Adhesion, April 2022

White Christopher, Sustainability Considerations with Innovative Building Envelope Designs. IIBEC/AEI Building Enclosure Symposium, Milwaukee, Wi. October 2022

White Christopher, Overview of innovations in the Building Envelope, Seventh Symposium on the Durability of Building and Construction Sealants and Adhesives June 14, 2022, Seattle, WA.

White, Christopher, Adapting to Changing Conditions, Innovations in the Building Envelope: Technical Innovations, Adapting to Changing Weather, and Disclosure Requirements Related to Climate Change Performance, AIA Building Envelope Committee, Portland, Or. Feb 2022.

White Christopher, Overview of the Business Environment related to Environmental, Social and governance Reporting, ASC Executive Leadership Conference 2021. San Diego, Ca

White, Christopher, The Importance of Environmental, Social, and Governance (ESG) reporting, Adhesives and Sealant conference, October 2021, San Diego, Ca.

White, Christopher, Don Hunston, Surprising Adhesion Increase from Salt Water exposure to AL/Epoxy interface, Sherwin Williams, January, 2021.

White, Christopher C, Understanding the Design Life of Materials. How is it Measured, Why you should

Care, and What is Possible. Society of Plastics Engineers Automotive Engineering Polyolefin Conference TPO, Service Life Prediction of ANTEC meeting, March 2019, Detroit, Mi

White Christopher, D. Hunston, L. Sung, Sealant Characterization and Aging, Wacker Silicones, Detroit, Mi October 2019.

White Christopher, A short introduction to Rheology and how it impacts Adhesives and Sealants, Adhesives and Sealant Council Meeting, Philadelphia, Pa, March 2019.

White, Christopher, Measuring the Value of Durability Testing, Adhesives and Sealant Council Meeting, Philadelphia, Pa, March 2019

White, Christopher, Impact of Design Life Determinations on Building Envelopes, AIA invited seminar series, Portland, Or, May 2019

White Christopher, Impact of Design Life Determinations on Building Envelopes, AIA invited seminar series, Tampa, Florida January, 2019

White, Christopher, Advances in Modeling Service Life Prediction, 3M Corporation, Minneapolis, MN 2018

White, Christopher, Durability Testing and Economics of Materials Section Decisions, Adhesives and Sealant Council Meeting, Miami Florida, April 2018.

White, Christopher, Durability Testing of Building Envelopes, Advanced Building Skins, Bern Switzerland, October 2018.

White, Christopher, Durability Testing for Polymers, Adhesives and Sealant Council Short Course, Baltimore 2015

White, Christopher C.; Hunston, Donald L.; Tan, Kar T, Potential for Service Life in Forensics, Joint DOJ/DHS/NIST Forensics Conference, 2015.

White, Christopher C. Advances in Service Life Prediction of Polymers, Arkema, October, 2015

White, Christopher C.; Hunston, Donald L.; Tan, Kar T, Aging of Polymeric Films used in Protective Glazing Systems, Proceedings of the 36th Annual Meeting of the Adhesion Society, New Orleans, LA. 2015

C. C. White, T. K. Tan, L. D. Hunston, Overview of the Dow Corning/NIST 20 year Partnership, Midland, Mi, 2015

C. C. White, T. K. Tan, L. D. Hunston, A. Pintar, and J. Filliben, Failure Prediction of Polymer Systems, NSF workshop on Polymer Life Performance, Arlington, Va., March 2014.

C. C. White, T. K. Tan, L. D. Hunston, A. Pintar, and J. Filliben, "Progress in the Development of a Method to Predict Sealant Modulus Change Due to Outdoor Weathering, Fifth Symposium on Durability of Building and Construction Sealants and Adhesives, June 25-26, 2014, Toronto, ON Canada

White, Christopher C.; Tan, Kar T.; Hunston, Donald An Update on Current Activities in Service Life Prediction, ASC Conference, Orlando, Fla, May 2014

White, Christopher C.; Tan, Kar T. ; Hunston, Donald L.; Gorham, Justin; Forster, Aaron M.; Bryan, Vogt D, Role of salt on adhesion of an epoxy/aluminum (oxide) interface in aqueous environments, Proceedings of the 35th Annual Meeting of the Adhesion Society, San Diego, Ca. 2014

C.C White, K. T. Tan, D.L. Hunston, Prediction of the changes in polymers due to outdoor weathering,

248th meeting of the American Chemical Society, San Francisco, Ca, 2014.

C.C. White, D. L. Hunston, Degradation of Polymer Films Employed in Protective Glazing, Public Policy Retreat of the Protective Glazing Council, Washington D.C., May 7-8. 2013

C.C. White, D.L. Hunston, K.T. Tan , Potential for Service Life Prediction, Gordon Conference on Adhesion, Mount Holyoke Ma, 2013

C.C. White, D.L. Hunston, K.T. Tan, Progress in Outdoor Weathering of Sealants, 6th EWS Symposium on Natural and Artificial Weathering, Bratislava, Slovakia, 2013

Christopher White, Don Hunston, Kar Tean Tan, Adam Pintar, Importance of Service Life Prediction Metric in PCR Development for Sealants, ASC Spring Confernece, Atlanta, Ga, 2013

Christopher White, Don Hunston, Kar Tean Tan, Adam Pintar, James Filliben, and Joannie Chin , Service Life Prediction of Sealant Materials , AIVC Airtightness Workshop 3rd Tight Vent Workshop on Building and Ductwork Airtightness, April 2013

C.C. White, D.L. Hunston, K.T. Tan, Little Things Mean a Lot, Water and the Adhesive Bond, The Mohs Rheology Research Seminar, Madison, WI, 2011.

C.C. White, D.L. Hunston, K.T. Tan, Ten Years of Progress with the Sealant Service Life Prediction Consortium, Dow Chemical Corp, Midland MI, 2011.

C.C. White, D.L. Hunston, K.T. Tan, Statistical Confirmation of the Major Weathering Elements Using the SPHERE Based Weathering Device, 4th International Symposium on Durability of Building and Construction Sealants and Adhesives. RILEM/ASTM, 2011.

C.C. White, D.L. Hunston, K.T. Tan, Evaluating Sealants Exposed in ASTM C1589 with Stress Relaxation Test Method, ASTM WK20492, 4th International Symposium on Durability of Building and Construction Sealants and Adhesives RILEM/ASTM, Anaheim, CA, 2011.

C.C. White, Developing a Predictive Model for Sealant Exposed to Weathering, Protective Glazing Council International, Washington DC, 2011.

C.C. White, W.R. Rossiter, Standards Development for Blast Resistant Trash Cans, Protective Glazing Council International, Washington DC, 2011.

C.C. White, SURFing at NIST, Savannah State University, 2011.

C.C. White, Service Life Prediction: a Career in Science and Engineering, Prince George Community College, 2010.

Virginia Tech Predicting the In-Service Performance of Sealant: A Surprisingly Complicated Problem" February 2010.

Adhesives and Sealant Council, Sealants in the Building Envelope Part III: Sealant behavior, Savannah, April 2010

ASC Webinar Technique for Monitoring Environmentally Induced Changes in Polymer Sealants, March 2010.

C.C. White, K.T. Tan and D.L. Hunston, Predicting the in-service performance of materials exposed to outdoor weathering, the Technical Seminar Proceedings of the 2010 week of learning Pressure Sensitive Tape Council – Tech 33, May 12-14, 2010, Las Vegas, NV.

C.C. White, K.T. Tan and D.L. Hunston Virginia Tech Predicting the In-Service Performance of Sealant: A Surprisingly Complicated Problem" February 2010.

C.C. White, K.T. Tan and D.L. Hunston Adhesives and Sealant Council, Sealants in the Building Envelope Part III: Sealant behavior, Savannah, April 2010

C.C. White, K.T. Tan and D.L. Hunston ASC Webinar Technique for Monitoring Environmentally Induced Changes in Polymer Sealants, March 2010.

C.C. White, D. Hunston, and K.T. Tan, "New Fracture Mechanics Based Test Methods for Spray Applied Fire Resistive Materials," EURADH 08 Meeting of the Society of Adhesion and Adhesives, Oxford, England, September 2008.

C.C. White, D. Hunston, and K.T. Tan, "The Dao of Sealants, Why Time Scale Matters in Sealant Testing" ASTM C24, Durability of Building and Construction Sealants and Adhesives, 3rd Symposium, Denver, June 2008

C.C. White, D. Hunston, and K.T. Tan, "The DAP-NIST consortium partnership on Sealant Research," Baltimore, MD April 2008

C.C. White, D. Hunston, and K.T. Tan, "The Dow Corning-NIST consortium partnership on Sealant Research," Midland, Mi, March 2008

C.C. White, D. L. Hunston, K. T. Tan, Predicting the In-Service Performance of Sealant, A Surprisingly Complicated Problem, World Adhesive Conference, April 2008, Miami.

C.C. White, Research at NIST, a significant opportunity, Louis Stokes Alliances for Minority Participation meeting, Jackson, MS, October 2007

C.C. White, D. Hunston, "Predicting the in-service Performance of Sealants," 4th International Congress on Service life prediction, Key Largo Florida, December 2006.

C.C. White, and D. Hunston, "Research on Sealant and Adhesives Durability," Division Seminar, Materials and Construction Research, NIST. March 2007

C.C. White and D. Hunston, Using Rheology to Quantify Weathering in Filled Elastomers, Rheological Research Center, University of Wisconsin-Madison, March 2007.

C.C. White and D. Hunston, "Critical Relative Humidity and Adhesion Loss," Adhesives and Sealant Council, April 2007, Savannah, Ga

C.C. White and D. Hunston. "Progress Toward a Method for Determining In-Service Performance of Sealant," Technical Leaders Summit for the Adhesives and Sealant Council, Baltimore November 06

C.C. White and D. Bentz, "NIST Recommendations and SFRM Research," National Fire Protection Contractors Association, Atlanta October 06.

C.C. White and D. Hunston, "Weathering of Elastomeric Coatings, progress towards a Method of Determining in-Service Performance," FSCT Advancements in Coatings Series "Coating Wood and Wood Composites: The Changing Future" Charlotte September 05

Christopher C. White, Peter L. Drzal, and Mark R. VanLandingham, "Nanoindentation, A Tool to Evaluate the Mechanical Properties of Adhesive and Sealant," ASTM Symposium on Durability of Building and Construction Sealants and Adhesives, Reno; NV June 2005.

Christopher White, "Developing a Reliability-Based Method for Service Life Prediction of Construction

Materials. “, Construction Chemicals Outlook 2004, December 2004, Philadelphia, Pa.

Christopher C. White, Peter L. Drzal, and Mark R. VanLandingham, “Issues Relating to the Use of Nanoindentation to Characterize Soft Material,” Adhesives and Sealant Council Meeting, Pittsburg, PA, November 2004

C.C. White, “Movement during Cure, Does it Matter?” Adhesives and Sealant Council, Cleveland, OH, 4/2004.

C.C. White, “Quantifying the Mechanical Properties of Sealant- A Major Step Towards the Development of a Service Life Prediction Method”, Materials and Construction Research Seminar Series, NIST, 12/2003.

C.C. White, “Quantifying the Mechanical Properties of Sealant- A Major Step Towards the Development of a Service Life Prediction Method” Construction and Materials Research Division Seminar, December 03.

C.C.White, D.L. Hunston, “An Examination of the Affect of Movement History During Cure of Building Joint Sealant”, ASC meeting Rosemont, Il. September 03

C.C. White, “Service Life Prediction Program for Sealant Formulations” Adhesives and Sealant Council, Chicago, Il, 9/2003.White, “Service Life Prediction for Sealant”, October 2002, Rhom & Haas corporate headquarters, Philadelphia, PA.

White, “High Throughput Screening for Filled Coating Evaluation”, NIST Combinatorial Methods Center – 3, October 2002.

White C.C. “Service Life Prediction, a Potential Solution to a 100 yr Old Problem” Virginia Tech, 2002.

White C.C. “Moisture Content and Durability”, 3rd Annual Conference on Wood Frame Construction, Madison, WI. 2001.

White C.C. “Measuring Moisture Content in Sealant” Adhesives and Sealant Council, Beverly Hills, Ca., 2002

White C.C. “Service Life Prediction Research at the National Institute of Standards and Technology”, Texas Tech University, Lubbock, Tx 2001

White C.C. “Sealant Service Life Prediction at the National Institute of Standards and Technology” Dow Corning Corporation, Midland Mi, also ChemRex, Minneapolis, Mn, and General Electric, Watertown, NY all in 2000

White C.C. “PATH research at NIST”, 2nd Annual Conference on Wood Frame Construction, Madison, WI 2000.

White C.C. “Sealant Research at NIST, Consortium Opportunities”, Adhesives and Sealant Council, Las Vegas, 2000.

White C.C., "Deviations From Assumed Behavior, The Metrology Of 0.1 Micron Polymer Films". 100nm Gigascale Integration, Sponsored by the Knowledge Foundation, San Francisco, February 1999.

White C.C., "An Overview of Polymer-Induced Modification of Solvent in Dilute Polymer Solutions". Naval Research Laboratory, Washington, DC, December 1996.

White C.C. and M.T. Shaw, "Current Strategies for Waste Management of Thermosetting Polymer Blends". Polymer Waste Management Symposium, University of Connecticut, Storrs, CT. November



1995.

White C.C. and J.L. Schrag, "New Considerations in the Study of Modification of Solvent by the Presence of Polymer in Solutions". Polymers in Critical Technologies, ACS Division of Polymer Chemistry-17th Biennial Polymer Symposium, San Juan, Puerto Rico, November 1994.

White C.C. "Design Considerations when Constructing Instrumentation for Precise Measurement of Viscoelastic Properties of Solutions". Loyola University, Chicago, Illinois, July 1994.

White C.C. and J.L. Schrag, "Studies of Solvent Modification by Polymer in Dilute Solution." Rheology Research Center, University of Wisconsin-Madison, October 1993.

White C.C. and J.L. Schrag, "New Working Equations for the Quartz Crystal Microbalance". Rheology Research Center, University of Wisconsin-Madison, September 1992.

### **Presentations**

A Steele, K Kulacki, C White, Unwrapped: Implications of Regulatory Restrictions and Recycling and Additives in Plastic Packaging, Society of Environmental Toxicology and Chemistry, (SEATC) North American 44th Annual Meeting, Louisville, Nov. 2023.

White Christopher, Update of ESG regulations related to Adhesives and Sealants, ASC meeting, New Orleans, March 2023

White Christopher, Benjamin Streifel, The evolving landscape of plastic waste, adhesion considerations, Adhesion Society meeting, Orlando, Fa, February 2023

White Christopher, Benjamin Streifel, Achim Watchung, PFAS in Fluoropolymer Processing, Society of Rheology, October 2022, Chicago, Ill, 2022.

White, Christopher. Hilda Buss, Konrad Kulacki, New Solutions to Plastic Waste, Adhesion Society meeting, San Diego, Ca, February 2022

White Christopher, Benjamin Streifel, Understanding the pathways for residual PFAS during fluoropolymer processing, Spring ACS meeting, San Diego, Ca. April 2022

Christopher White, Don Hunston, Progress on Validating Service Life Prediction using Outdoor Data, Society of Rheology Meeting, October 2021, Bangor Maine.

topher C. White , Don Hunston, Kar Ten Tan, E. P. O'Brien, Applied Strain on Sealant Samples Exposed to Outdoor Weather, 6th World Congress on Adhesion and Related Phenomena .41st Annual Meeting of the Adhesion Society, Feb. 2018,

ite, Christopher, Donald Hunston, Eric Byrd, Annual Technical Conference, Society of Plastics Engineers, Orlando, Fla. 2015

White, Christopher C.; Hunston, Donald L.; Tan, Kar Tean;., Applied Strain on Sealant Samples Exposed to Outdoor Weather, EWS meeting Bratislava, Slovakia, 2015.

C.C. White, D.L. Hunston, K.T. Tan, Outdoor Weathering of Sealants, 86nd Meeting of the Society of Rheology, Philadelphia, Pa,2014.

C. White, D.L. Hunston, K.T. Tan, Outdoor Weathering of Sealants, 85nd Meeting of the Society of Rheology, Pasadena, Ca,2013.

White C.C., Tan K.T, and Hunston D, Modeling the Environmentally Induced Changes in Elastomer

Modulus, 83rd annual meeting of the Society of Rheology, October 9-14, 2011, Cleveland, OH,

White C.C., Tan K.T., Langhorst, A., Stanley, D. and Hunston D., Again of Polymeric Films used in Protective Glazing Systems, 34rd Annual Meeting of the Adhesion Society, Feb. 2012,

White C.C., Tan K.T., Langhorst, A., Stanley, D. and Hunston D., Again of Polymeric Films used in Protective Glazing Systems, PGCI symposium, Oct 27, 2011, NIST.

C.C. White, D.L. Hunston, K.T. Tan, American Society of Mechanical Engineers, April 2010.

C.C. White, D.L. Hunston, K.T. Tan, Service Life Prediction for Sealants, 5th European Weathering Symposium, Lisbon, Portugal, September 2011

C.C. White, D. L. Hunston, K.T. Tan, Method for measuring the non-linear modulus filled elastomers after weathering, 82nd Meeting of the Society of Rheology, Santa Fe, NM, October 2010.

White C.C., Tan K.T., and Hunston D, Modeling the Environmentally Induced Changes in Elastomer Modulus, 83rd annual meeting of the Society of Rheology, October 9-14, 2011, Cleveland, OH

D.L. Hunston, K.T. Tan, B.D. Vogt, S.K. Satija, C. Clerici and C.C. White, Little things mean a lot: Water and the adhesive bond, Proceedings of the 33rd Annual Meeting of the Adhesion Society, Inc., Feb. 21-24, 2010, G. Anderson (Ed.), pp. 4-6 Daytona Beach, FL.

K.T. Tan, C.C. White, D.L. Hunston, K. Steffens, T. Hatlee, K. Hamilton, B.D. Vogt and J.W. Chin, Roles of adhesive and interfacial properties on humidity-induced failure, Proceedings of the 33rd Annual Meeting of the Adhesion Society, Inc., Feb. 21-24, 2010, G. Anderson (Ed.), pp. 186-188, Daytona Beach, FL.

C.C. White, K.T. Tan and D.L. Hunston, Development of adhesion test methods for spray-applied fire resistive materials, Proceedings of the 33rd Annual Meeting of the Adhesion Society, Inc., Feb. 21-24, 2010, G. Anderson (Ed.), pp. 201-203, Daytona Beach, FL.

C. Bernard, T. Nguyen, B. Pellegrin, M. Celina, A. Shapiro, D. Stanley, K.T. Tan, S. Park, R. Ruoff and J. Chin, Water-based polyurethane graphene oxide nanocomposites, Proceedings of the 33rd Annual Meeting of the Adhesion Society, Inc., Feb. 21-24, 2010, G. Anderson (Ed.), pp. 132-134, Daytona Beach, FL.

K.T. Tan, C.C. White, and D.L. Hunston, Adhesion of fire resistive materials to structural steel, Proceedings of the 31th Annual Meeting of the Adhesion Society, Inc., Feb. 17-20, 2008, Austin, TX, G. Anderson (Ed.), pp. 379-381.

K. Hamilton, C.C. White, K.T. Tan, and D.L. Hunston, Moisture induced adhesion loss of poly(methyl methacrylate) and (N-butyl methacrylate)/glass joints, Proceedings of the 31th Annual Meeting of the Adhesion Society, Inc., Feb. 17-20, 2008, Austin, TX, G. Anderson (Ed.), pp. 185-186.

K.T. Tan, C.C. White, J. Goldman, C. Clerici, S.K. Satija, D.L. Hunston, and B.D. Vogt, Mechanisms of critical relative humidity using combined fracture mechanics and nanoscale characterization, Proceedings of the 31th Annual Meeting of the Adhesion Society, Inc., Feb. 17-20, 2008, Austin, TX, G. Anderson (Ed.), pp. 48-50.

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## Project Experience

Created and led a multinational consortium that developed a foundational framework to establish new measurement methods to quantify the material durability over two decades. This consortium successfully brought modern polymer science to the building joint sealant industry, as demonstrated by the passage of 17 new and significant revisions of ASTM and ISO standards.

Dr. White has led multi-agency public-private projects to standardize the blast resistance of waste receptacles in public assembly locations (transit systems, stadiums, etc.). The project successfully led to the creation of a baseline security requirement for these locations.

As part of the multidisciplinary task force, Dr. White contributed to the development and adoption of the enterprise risk management (ERM) framework for a principal federal agency.

Led a multidisciplinary, multinational public-private consortium which developed test methods related to the performance of Spray Applied Fire Resistant coatings. This project resulted in improvements to applicable building codes and ASTM test standards.

## Additional Education & Training

Comprehensive Overview of Police Skills, FLETC Training Center, 2012.

## Research Grants

National Institute of Standards and Technology (NIST), Service Life Prediction for Sealant Consortia 2001-2020

Department of Homeland Security, Standards Development grant 2010-2014

US Housing and Urban Development, NIST/PATH Durability Research Grant, 2000-2007

NIST, Fire Resistive Materials for Structural Steel consortium, 2005-2009

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## Peer Reviews

Underwriters Laboratory, PCR reviewer, Journal of Rheology, Soft Matter, Journal of Photonics, Journal of Polymer Science and Engineering, ANTEC, Journal of Non-Newtonian Fluid Mechanics, Reviews of Scientific Instruments, Journal of Polymer Science, Part B Polymer Physics.