



**Exponent®**  
Engineering & Scientific Consulting

## Jared Tracy, Ph.D.

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### Professional Profile

Dr. Tracy has over ten years of experience addressing challenging problems in the field of materials science, with particular focus in the areas of materials reliability, mechanics of delamination and cracking, and failure analysis. His background includes analyses of polymers, ceramics, metals and composites in applications spanning consumer electronics, photovoltaics, laminated structures, architectural coatings, adhesives, and aerospace composites.

Dr. Tracy has conducted extensive work in the area of accelerated testing, with particular interest in correlating results of laboratory testing with outdoor performance for risk assessment and material lifetime prediction. He has extensive experience in materials testing and characterization, including the evaluation of mechanical and rheological properties, fracture parameters, interface adhesion, material chemistry and structure, weathering, and chemical resistance.

Prior to rejoining Exponent, Dr. Tracy worked at DuPont as a Principal Investigator, where he managed and supported projects in materials reliability, product commercialization, and application development. He conducted postdoctoral research at Stanford University that focused on characterizing toughness and durability of interfaces in applications spanning photovoltaic packaging materials, thin film structures, and adhesive bonded joints. Dr. Tracy completed his graduate work at the University of Michigan, where he used digital image correlation—then an evolving, non-contact deformation metrology—to evaluate damage progression in ceramic matrix composites. His work elucidated the evolution of damage in fibrous composites from crack initiation at microscopic length scales to final fracture of composite laminates.

### Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, University of Michigan, Ann Arbor, 2014

B.S., Materials Science and Engineering, University of Michigan, Ann Arbor, 2003

### Academic Appointments

Postdoctoral Scholar, Materials Science and Engineering, Stanford University, 2015-2017

### Prior Experience

Principal Investigator, DuPont, 2018-2022

Senior Associate, Exponent, 2018

Graduate Student Research Assistant, University of Michigan, 2009–2014

Naval Surface Warfare Officer, 2003-2009

## Publications

Thornton P, Tracy J, Roraff P, Roy Choudhury K, Dauskardt RH. Durability of Polyolefin Encapsulation in Photovoltaic Modules with SmartWire Technology. Proceedings of the IEEE 48th Photovoltaic Specialists Conference 2021; 1170-1172.

Slauch I, Vishwakarma S, Tracy J, Gambogi W, Meier R, Rahman F, Hartley J, Bertoni M. Manufacturing Induced Bending Stresses: Glass-Glass vs. Glass-Backsheet. Proceedings of the IEEE 48th Photovoltaic Specialists Conference 2021; 1943-1948.

Tracy J, Bosco N, Novoa F, Dauskardt RH. Durability of Ionomer Encapsulants in Photovoltaic Modules. Solar Energy Materials and Solar Cells 2020; 208:110397.

Bosco N, Tracy J, Dauskardt RH. Environmental Influence on Module Delamination Rate. IEEE Journal of Photovoltaics 2019; 9(2):469-475.

Tracy J, et al. Survey of Material Degradation in Globally Fielded PV Modules. Proceedings of the IEEE 46th Photovoltaic Specialists Conference 2019;0874-0879.

Tracy J, D'hooge D, Bosco N, Delgado C, Dauskardt RH. Evaluating and predicting molecular mechanisms of adhesive degradation during field and accelerated aging of photovoltaic modules. Progress in Photovoltaics: Research and Applications 2018; 26:981– 993.

Tang-Kong R, Winter R, Brock R, Tracy J, Eizenberg M, Dauskardt RH, McIntyre P. The Role of Catalyst Adhesion in ALD-TiO<sub>2</sub> Protection of Water Splitting Silicon Anodes. ACS Applied Materials & Interfaces 2018; 10(43): 37103–37109.

Tracy J, Yin Y, Yang J, Osborne J, Blohowiak K, Dauskardt RH. Environmentally Assisted Crack Growth in Adhesively Bonded Composite Joints. Composites Part A: Applied Science and Manufacturing 2017; 102:368-377.

Tracy J, Waas A, Daly S. Statistical Analysis of the Influence of Microstructure on Damage in Fibrous Ceramic Matrix Composites. International Journal of Applied Ceramic Technology 2017; 14(3):354-366.

Sevener K, Tracy J, Chen Z, Kiser J, Daly S. Crack Opening Behavior in Ceramic Matrix Composites. Journal of the American Ceramic Society 2017; 100:4734-4747.

Tracy J, Bosco N, Dauskardt RH. Encapsulant Adhesion to Surface Metallization on Solar Cells. IEEE Journal of Photovoltaics 2017; 7(6):1635-1639.

Bosco N, Eafanti J, Kurtz A, Tracy J, Dauskardt RH. Defining Threshold Values of Encapsulant and Backsheet Adhesion for PV Module Reliability. Proceedings of the IEEE 44th Photovoltaic Specialists Conference 2017; 3190-3194.

Tracy J, Bosco N, Novoa F, Dauskardt RH. Encapsulation and Backsheet Adhesion Metrology for Photovoltaic Modules. Progress in Photovoltaics: Research and Applications 2016; 25(1):87-96.

Bosco N, Tracy J, Dauskardt RH, Kurtz S. Development and first results of the width-tapered beam method for adhesion testing of photovoltaic material systems. Proceedings of the IEEE 43rd Photovoltaic Specialists Conference 2016; 0106-0110.

Tracy J, Waas A, Daly S. A New Experimental Approach for In Situ Damage Assessment in Ceramic Matrix Composites at High Temperature. Journal of the American Ceramic Society 2015; 98(6):1898-196.

Tracy J, Waas A, Daly S. Experimental Assessment of Fracture Toughness in Ceramic Matrix Composites Using the J-integral with Digital Image Correlation Part I: Methodology and Validation. *Journal of Materials Science* 2015; 50:4646-4658 (Cover Article).

Tracy J, Waas A, Daly S. Experimental Assessment of Fracture Toughness in Ceramic Matrix Composites Using the J-integral with Digital Image Correlation Part II: Application to SiC/SiC CMCs. *Journal of Materials Science* 2015; 50:4659-4671.

Tracy J, Daly S, Sevener K. Multi-Scale Damage Characterization in Continuous Fiber Matrix Composites Using Digital Image Correlation. *Journal of Materials Science* 2015; 50:5286-5299.

## **Presentations**

Tracy J. Importance of Material Selection on Building Structure Aesthetics and Performance. Oral presentation, MetalCon, Tampa, FL, 2021.

Tracy J, et. al. Durability of Packaging Materials in Globally Fielded PV Modules. Oral presentation, NIST/UL Workshop of PV Materials Durability, Gaithersburg, MD, 2019.

Tracy J, et. al. Survey of Material Degradation in Globally Fielded PV Modules. Oral presentation, 46th IEEE Photovoltaic Specialists Conference (PVSC), Chicago, IL, 2019.

Tracy J, Bosco N, Dauskardt RH. Encapsulant Adhesion to Surface Metallization on Photovoltaic Cells. Oral presentation, 44th IEEE Photovoltaic Specialists Conference (PVSC), Washington, D.C., 2017.

Tracy J, Bosco N, Dauskardt RH, Adhesive Degradation of Encapsulant in Field and Lab Aged PV Modules. Oral presentation, Bay Area Photovoltaic Consortium, Palo Alto, CA, 2017

Tracy J, Bosco N, Dauskardt RH, Adhesion Characterization of PV Module Encapsulation and Backsheet Structure. Oral presentation, Bay Area Photovoltaic Consortium, Palo Alto, CA, Jun 2016.

Tracy J, Dauskardt R, Advanced Metrology for Characterizing Adhesion in Solar Modules. Oral presentation, Bay Area Photovoltaic Consortium, Berkeley, CA, 2015.

Tracy J, Daly S. Characterization of Fracture in CMCs at the Microstructural Length Scale. Oral presentation, 38th Annual Conference on Composites, Materials and Structures, Cocoa Beach, FL, 2014.

Tracy J, Daly S. Mechanisms of Deformation and Failure in CMCs at the Microstructural Length Scale. Oral presentation, 37th Annual Conference on Composites, Materials and Structures, Cocoa Beach, FL, 2013.

## **Peer Reviews**

IEEE Journal of Photovoltaics