

John M. Baldwin, Ph.D.
Principal Scientist

Professional Profile

Dr. John M. Baldwin is a Principal Scientist in Exponent's Vehicle Engineering practice. His expertise includes polymer science and technology, specializing in the synthesis, compounding, degradation (chemical/physical), and testing of elastomer, plastic, adhesive, and foam based systems.

Prior to joining Exponent, Dr. Baldwin worked in the Research Laboratory of Ford Motor Company, where he became internationally recognized for his research on the topics of tire aging, tire test development, tire service life prediction, and the use of nitrogen as a tire inflation media. Before joining Ford Research, Dr. Baldwin worked in the Advanced Manufacturing Technology Department where he researched and implemented high volume, automated adhesive, sealer, and structural foam dispensing processes along with automated in-process quality tests. Based on his professional and academic background, Dr. Baldwin was placed on a major tire recall root cause analysis team, where he was responsible for developing, coordinating, and implementing the chemical and physical testing of thousands of new and recalled tires.

Dr. Baldwin worked for the 3M Company prior to joining Ford. While working in the 3M Automotive Division, he developed and serviced a line of 2-part structural epoxy adhesives that were sold to automotive manufacturers and the aftermarket. Dr. Baldwin, as a member of 3M Occupational Health and Environmental Specialties Division, was responsible for the material research and development, as well as the process engineering, of the blown microfiber non-woven filter media used in maintenance-free respirators.

Dr. Baldwin holds an appointment as an Adjunct Associate Professor of Chemistry at Oakland University in Rochester, Michigan, where he teaches classes in polymer synthesis and polymer characterization.

Academic Credentials and Professional Honors

Ph.D., Polymer Science, The University of Akron, 1992
B.S., Chemistry, The University of Detroit, 1986

Member of Sigma Xi; Certified Six Sigma Greenbelt

Publications

Baldwin JM, Bauer DR. Rubber oxidation and tire aging—A review. *Rubber Chemistry and Technology* 2008; 81(2):338–358.

Ellwood KRJ, Baldwin JM, Bauer DR. Numerical model for nitrogen tire inflation. *Tire Science and Technology* 2007; 35:300-316.

Ellwood KRJ, Baldwin JM, Bauer DR. Numerische Simulation der thermischen oxidation in kraftfahrzeugreifen. *GAK Gummi Fasern Kunststoffe*, 60 Jahrgang, Oktober 2007; S:664–674.

Baldwin JM, Bauer DR, Ellwood KRJ. Correlation of laboratory tire endurance and rubber aging. *Rubber Chemistry and Technology* 2007; 80(4):726–737.

Baldwin JM, Bauer DR, Ellwood KRJ. Rubber aging in tires. I. Field results. *Polymer Degradation and Stability* 2007; 92(1):103–109.

Bauer DR, Baldwin JM, Ellwood KRJ. Rubber aging in tires. 2. Accelerated oven aging tests. *Polymer Degradation and Stability* 2007; 92(1):110–117.

Ellwood KRJ, Baldwin JM, Bauer DR. Numerical simulation of thermal oxidation in automotive tires. *Rubber Chemistry and Technology* 2006; 79(2):249–266.

Ellwood KRJ, Baldwin JM, Bauer DR. A finite-element model for oven aged tires. *Tire Science and Technology* 2005; 33:103–119.

Baldwin JM, Bauer DR, Ellwood KRJ. Accelerated aging of tires, Part II. *Rubber Chemistry and Technology* 2005; 78(2):336–353.

Baldwin JM, Bauer DR, Hurley PD. Field aging of tires, Part II. *Rubber Chemistry and Technology* 2005; 78(5):754–766.

Baldwin JM, Bauer DR, Ellwood KRJ. Accelerated aging of tires, Part III. *Rubber Chemistry and Technology* 2005; 78(5):767–776.

Bauer DR, Baldwin JM, Ellwood KRJ. Correlation of rubber properties between field aged tires and laboratory aged tires. *Rubber Chemistry and Technology* 2005; 78(5):777–792.

Baldwin JM, Bauer DR, Ellwood KRJ. Effects of nitrogen inflation on tire aging and performance. *Rubber Plastics News* 2004; 34(4):14–19.

Published Abstracts of Conference Proceedings

Baldwin JM, Lo CC, Harwood HJ. Polymer Preprints 1991; 32(1): 557–558.

Conference Proceedings

Pascarella RJ, Tandy DF Jr., Neal JW, Baldwin JM, Rehkopf JD. Effect of tire wear on tire force and moment characteristics. Presented at the Tire Society Meeting, September 2008.

Baldwin JM, Bauer DR, Rehkopf JD, Guyer E, Ledwith P. Degradation of VMQ silicones in engine sealing applications. Presented at the 173rd Technical Meeting of the ACS Rubber Division, Dearborn, MI, April 2008.

Tandy DF Jr, Durisek NJ, Baldwin JM, Pascarella RJ. Vehicle response comparison to tire tread separations induced by circumferentially cut and distressed tires. Presented at a meeting of the Society of Automotive Engineers, Detroit, MI, 2007.

Baldwin JM, Bauer DR, Ellwood KRJ. Correlation of laboratory tire aging and endurance results to field performance of tires. Presented at the Rubber Division, American Chemical Society, Cincinnati, OH, October 10–12, 2006.

Bauer DR, Baldwin JM, Ellwood KRJ. Correlation of laboratory tire endurance and rubber aging. Presented at the Rubber Division, American Chemical Society, Cincinnati, OH, October 10–12, 2006.

Baldwin JM, Pascarella RJ, Tandy DF, Tandy KT, Granat KJ, Durisek NJ. The chemistry and physics of a natural tread separation. Presented at the Tire Society, Akron, OH, September 10–11, 2006.

Ellwood KRJ, Baldwin JM, Bauer DR. Nitrogen tire inflation. Presented at the Tire Society, Akron, OH, September 10–11, 2006.

Baldwin JM. Tire aging update. Presented at the International Tire Exposition and Conference, Akron, OH, September 11–14, 2006.

Baldwin JM. Rubber research at Ford Motor Company. Presented at the 1st World Rubber and Latex Summit, Bangkok, Thailand, 2006.

Baldwin JM. Tire aging update. Presented at the Tire Industry Conference, Hilton Head, SC, March 16, 2006.

Baldwin JM, Bauer DR, Hurley PD. Field aging of tires, Part III. Presented at a meeting of the Rubber Division, American Chemical Society, San Antonio, TX, May 16–18, 2005.

Bauer DR, Baldwin JM, Ellwood KRJ. Correlation of rubber properties between field aged tires and laboratory aged tires, Part II. Presented at a meeting of the Rubber Division, American Chemical Society, San Antonio, TX, May 16–18, 2005.

Baldwin JM. Development of tire aging tests. Presented at a meeting of the International Tire Exposition and Conference, Akron, OH, September 21–23, 2004.

Baldwin JM, Bauer DR, Ellwood KRJ. Effects of nitrogen inflation on tire aging and performance. Presented at a meeting of the Rubber Division, American Chemical Society, Grand Rapids, MI, May 17–19, 2004.

Baldwin JM. Aged rubber properties of North American field aged tires. Presented at the Tire Technology Exposition, Stuttgart, Germany, March 24, 2004.

Baldwin JM. The effects of tire aging on laboratory tests of tire performance. Presented at the Tire Industry Conference, Hilton Head, SC, March 11, 2004.

Baldwin JM. Analysis of tire aging protocols proposed By NHTSA for inclusion into FMVSS 139. Presented at a meeting of the Tire Society, Akron, OH, September 23–24, 2003.

Baldwin JM. High speed testing of tires and the use of constant deflection. Presented at a meeting of the Tire Society, Akron, OH, September 23–24, 2003.

Baldwin JM, Dawson MA, Hurley PD. Field aging of tires, Part I. Presented at a meeting of the Rubber Division, American Chemical Society, Cleveland, OH, October 14–16, 2003.

Baldwin JM. Accelerated aging of tires, Part I. Presented at a meeting of the Rubber Division, American Chemical Society, Cleveland, OH, October 14–16, 2003.

Dawson MA, Baldwin JM. Peel adhesion as a measure of rubber properties for steel belted radial tires. Presented at a meeting of the Rubber Division, American Chemical Society, Cleveland, OH, October 14–16, 2003.

Brown LM, Hurley PD, Baldwin JM. Hydrocarbon evaporative emissions from tires. Presented at a meeting of the Rubber Division, American Chemical Society, Cleveland, OH, October 14–16, 2003.

Baldwin JM. The future of adhesives in automotive applications. Plenary Lecture, Virginia Tech University Adhesives Conference, 2000.

Baldwin JM, Marhevka VC, Tarbutton KS, Yorkgitis EM. Two component room temperature or induction curable structural adhesives for automotive applications. SAE Paper 950129, 1995.

Book Chapters

Oxidative aging of rubber in tires. In: Current Topics of Elastomer Research. Bhowmick AK (ed), Taylor & Francis Group, LLC, CRC Press, 2008.

Patents

US 8020597: Oxidation Shield for Tires, September 20, 2011 (Ellwood K, Baldwin JM, Bauer D, Rohweder D).

DE69530849T2: Epoxidharzklebstoffzusammensetzung, Minnesota Mining and Manufacturing, 2004 (Baldwin JM, Robins J).

US6539314 B1: Method for Simulating A Joint, Ford Motor Company, 2003 (Ondrus DJ, Kulkarni HT, Baldwin JM).

EP0782601B1: Epoxy Adhesive Composition, Minnesota Mining & Manufacturing 2003 (Baldwin JM, Robins J).

US5629380 A: Epoxy Adhesive Composition Comprising a Calcium Salt and Mannich Base, Minnesota Mining & Manufacturing, 1997 (Baldwin JM, Robins J).

EP0782601A1: Epoxy Adhesive Composition, Minnesota Mining & Manufacturing, 1997 (Baldwin JM, Robins K).

WO9609352A1: Epoxy Adhesive Composition, Minnesota Mining & Manufacturing, 1996 (Baldwin JM, Robins J).

Academic Appointments

- Adjunct Associate Professor of Chemistry, Oakland University in Rochester, Michigan

Peer Reviewer

- *Rubber Chemistry and Technology*

Professional Affiliations

- American Chemical Society—ACS
- Rubber Division, American Chemical Society, winner of Best Paper award at the Spring 2004 meeting
- Society of Automotive Engineers—SAE
 - Highway Tire Committee and Vice Chairman of Rolling Resistance Task Group
- American Society for Testing and Materials—ASTM
 - F09 Tire Committee
- Tire Society, Session chair for fall meeting in September 2004