

## **Richard J. Lee**

**Affiliation:** RJ Lee Group, Inc.  
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Monroeville, PA 15146

### **Education:**

- Ph.D., Theoretical Solid State Physics, Colorado State University, 1970
- B.S., Physics, University of North Dakota, 1966

### **Career/Employment:**

- RJ Lee Group, Inc., CEO, 2009 – Present
- RJ Lee Group, Inc., President, 1986 – 2009
- U. S. Steel Technical Center, Head - Physics, Electron Microscopy and Surface Analysis Section, 1973 - 1985
- Purdue University, Associate Professor, 1971
- Purdue University, Assistant Professor, 1970
- Lake Region Junior College, Instructor, 1966

### **Summary:**

- Pioneered the use of quantitative electron diffraction techniques for the identification of asbestos
- Development of automated techniques for combined x-ray microanalysis and electron microscopy
- Developed and manufactured first PC-based Scanning Electron Microscope
- Developed and manufactured Forensic product for GSR
- Developed and manufactured Forensic LIMS software
- Developed NYS DOH Method LAB 055 for the analysis of asbestos in Spray-on Fireproofing (SOF-V) and Surfacing Material (SM-V) containing Vermiculite
- Technical Advisor for The Vermiculite Association (TVA)

### **Honors, Awards, Fellowships & Memberships:**

- Microbeam Analysis Society
- ASM International
- ASTM Committee
- American Concrete Institute
- National Stone, Sand and Gravel Association
- Health Effects Institute - Asbestos Research Literature Review Panel
- EPA Scientific Review Panel on Air Chemistry and Physics
- EPA Select Panel for Development of Methodology for Asbestos Analysis by Transmission Electron Microscopy
- Advisor on asbestos analysis to the Environmental Protection Agency
- External Advisory Committee for the College of Natural Sciences, Colorado State University
- National Defense Education Act Fellowship
- Entrepreneur of the Year – Mid-Atlantic States, 1991
- Innovator of the Year – North Dakota, 1998
- Honorary Doctor of Science – University of North Dakota, 1996
- R&D 100 2016 – Waste-Tire Derived Carbon

**Publications & Presentations:** 229

**Patents:** 6

## Publications and Presentations

Abelmann, A., J.R. Maskrey, J.T. Lotter, A.M. Chapman, M.D. Nembhard, J.S. Pierce, J.M. Wilmoth, R.J. Lee, and D.J. Paustenbach, "Evaluation of take-home exposure to asbestos from handling asbestos-contaminated worker clothing following the abrasive sawing of cement pipe" *Inhalation Toxicology*, January 2018, <https://doi.org/10.1080/08958378.2017.1418940>.

Yunchao, L., R.A. Adams, A. Arora, V.G. Pol, A.M. Levine, R.J. Lee, K. Akato, A.K. Naskar, M.P. Paranthaman, "Sustainable Potassium-Ion Battery Anodes Derived from Waste-Tire Rubber", *Journal of The Electrochemical Society*, 164 (6) A1234-A1238, 2017.

Yunchao, L., Y. Cheng, L.L. Daemen, G.M. Veith, A.M. Levine, R.J. Lee, S.M. Mahurin, S. Dai, A.K. Naskar, M.P. Paranthaman, "Neutron Vibrational Spectroscopic Studies of Novel Tire-Derived Carbon Materials", *Royal Society of Chemistry, Physical Chemistry Chemical Physics (PCCP)*, DOI: 10.1039/c7cp03750c, 2017.

Lee, R.J., D.R. Van Orden, L.A. Cox, S. Arlauckas, R.J. Kautz, "RE: In response to Harper and Key-Schwartz Letter to the Editor: Preparation of Respirable Crystalline Silica Samples for Subsequent Analysis", *Regulatory Toxicology and Pharmacology*, Vol. 83, pp, 103, 2017.

Yunchao L., M.P. Paranthaman, K. Akato, A.K. Naskar, A.M. Levine, R.J. Lee, S.O. Kim, J. Zhang, S. Dai, A. Manthiram, "Tire-Derived Carbon Composite Anodes for Sodium-ion Batteries", *Journal of Power Sources*, 316, pp. 232-238, 2016.

Lee, R.L., D.R. Van Orden, L.A. Cox, S. Arlauckas, R.J. Kautz, "Impact of muffle furnace preparation on the results of crystalline silica analysis", *Regulatory Toxicology and Pharmacology* Vol. 80, pp. 164-172, 2016.

Van Orden, D.R., R.J. Lee, C.M. Hefferan, S. Schlaegle, M. Sanchez, "Determination of the Size Distribution of Amphibole Asbestos and Amphibole Non-Asbestos Mineral Particles", *The Microscope*, Vol. 64:1, pp. 13-25, 2016.

Lee, R., Van Orden, D. and Sanchez, M. (2016). "Response to Gordon 2016", *International Journal of Occupational and Environmental Health*, 23, pp. 172-176, <https://doi.org/10.1080/10773525.2016.1227038>.

Lee, R. J., Bandli, B. R., Sanchez, M. S., and Van Orden, D. R. (2016). "A Proposed Method for TEM Analysis of Elongate Mineral Particles", *ASTM Michael E. Beard Conference: Asbestos and Fibrous Mineral Analysis and Research*, San Antonio, Texas.

McGrath, M., M. Sanchez, L. Li, D. Van Orden, R. Lee, "Characterization of Structurally Coherent Mineral Intergrowths in Cosmetic Talc", presented at 2015 GSA Annual Meeting, Baltimore, MD, November 2015.

Ilgren, E.B., D.R. Van Orden, R.J. Lee, Y.M. Kamiya, J.A. Hoskins, "Further Studies of Bolivian Crocidolite—Part IV: Fibre Width, Fibre Drift and their relation to Mesothelioma Induction: Preliminary Findings", *Epidemiology Biostatistics and Public Health*, Vol. 12, No. 2, 2015, <http://dx.doi.org/10.2427/11167>.

Cox, L. A., Jr., D.R. Van Orden, R.J. Lee, S. Arlauckas, R.J. Kautz, A.L. Warzel, K.F. Bailey, A.K. Ranpuria, "How reliable are crystalline silica dust concentration measurements?", *Regulatory Toxicology and Pharmacology*, Vol. 73, pp. 126-136, October 2015,

Lee, R.J., D.R. Van Orden, "Letter to the Editor: Asbestos in commercial cosmetic talcum powder as a cause of mesothelioma in women", *International Journal of Occupational and Environmental Health*, 21, pp. 337-341, 2015

McAllister, N., S. Schlaegle, R.J. Lee, C.M. Hefferan, "Characterization of Talc Using High Resolution Automated Scanning Electron Microscopy", Presented at Inter/Micro 2015 symposium, McCrone Research Institute, June 2015.

Sahmel, J., C.A. Barlow, S. Gaffney, H.J. Avens, A.K. Madl, J. Henshaw, K. Unice, D. Galbraith, G. DeRose, R.J. Lee, D. Van Orden, M. Sanchez, M. Zock, D.J. Paustenbach, "Airborne asbestos take-home exposures during handling of chrysotile-contaminated clothing following simulated full shift workplace exposures", *Journal of Exposure Science and Environmental Epidemiology*, Vol. 26, pp. 48-62, 2015.

Ilgren, E.B., D. Van Orden, R. Lee, Y. Kamiya, J.A. Hoskins, "Environmental 'Low Dose' Mesotheliomas and Their Relationship to Domestic Exposures-Preliminary Report", *Environment and Pollution*, Vol. 3, No. 2, pp. 48-54, 2014.

Perricone, M.J., K.E. Wagner, R.J. Lee, "Material Challenges in Assessing Long Term Environmental Durability of High Performance Concrete Using Standard Accelerated Tests", Presented at the Materials Science & Technology Conference, Pittsburgh, PA, October 2014.

Lee, R.J., "Testimony in Informal Public Hearings for the Proposed Rule on Occupational Exposure to Respirable Crystalline Silica to United States Department of Labor, Occupational Safety, and Health Administration," Washington, DC, March 2014.

Lee, R.J., M.S. Sanchez, D.R. Van Orden, L. Li, "Acceptability of Method Short Cuts in TEM Asbestos Analysis", presented at Inter/Micro, McCrone Research Institute, Jun 2-4, 2014.

Sahmel, J., C.A. Barlow, B. Simmons, S.H. Gaffney, H.J. Avens, A.K. Madl, J. Henshaw, R.J. Lee, D. Van Orden, M. Sanchez, M. Zock, D.J. Paustenbach, "Evaluation of take-Home Exposure and Risk Associated with the Handling of Clothing Contaminated with Chrysotile Asbestos", *Risk Analysis*, 34:8, pp. 1448-1468, 2014.

Beyene, M., A. Snyder, R.J. Lee, M. Blaszkiewicz, "Alkali Silica Reaction (ASR) as a root cause of distress in a concrete made from Alkali Carbonate Reaction (ACR) potentially susceptible aggregate", *Cement and Concrete Research*, Volume 51, September 2013, pp 85-95.

Rickabaugh, K.P., R.J. Lee, "The Environmental Aftermath of 9/11 – World Trade Center Particulate Contamination Signature", Tripartite Symposium 2013, Carlow University, AJ Palumbo Hall of Science and Technology, Room 107, 3333 Fifth Avenue, Oakland, PA

Beyene, M., R. J. Lee, M. Silsbee, "Floor Coating Failure - Gel found beneath a blistered coating may not always be NSAR," *Concrete Construction*, September 2012.

Ilgren, E., D.R. Van Orden, Y. Kamiya, J. Hoskins, "Further Evidence for Fiber Width as a Determinant of Mesothelioma Induction and Threshold--Anthophyllite, Bolivian Crocidolite, and Cape Crocidolite", *Annals of Respiratory Medicine*, July 2012.

Van Orden, D.R., R.J. Lee, M.S. Sanchez, M.D. Zock, "The Size Distribution of Airborne Bolivian Crocidolite Fibers", *Annals of Respiratory Medicine*, July 2012.

Van Orden, D.R., R.J. Lee, M.S. Sanchez, M.D. Zock, E.B. Ilgren, Y. Kamiya, "Evaluation of Airborne Crocidolite Fibers at an Asbestos-Cement Plant", *Annals of Respiratory Medicine*, July 2012.

Lee, R.J., K.A. Allison, K.L. Bunker, K.E. Harris, J.C. Huntington, M.S. Sanchez, B.R. Strohmeier, D.R. Van Orden, "The Challenges of Defining and Characterizing Asbestos", presented at the 45<sup>th</sup> Annual Meeting of the Northeastern Section, GSA, S3. Asbestos I: Past Present, and Future, March 14, 2010.

Lee, R. J., Van Orden, D. R., and Sanchez, M. (2010). "Common Errors Associated with the Analysis of Tremolitic Talc", presented at 2010 ME Beard Conference, San Antonio, TX, January 28, 2010.

Van Orden, D. R., Lee, R. J., Allison, K. A., and Addison, J. (2009). "Width Distributions of Asbestos and Non-Asbestos Amphibole Minerals", *Indoor and Built Environment*, 18, pp. 531–540, <https://doi.org/10.1177/1420326X09341503>.

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Jones, A.D., A. Apsley, S. Clark, J. Addison, D.R. Van Orden, R.J. Lee, "Laboratory Tests to Compare Airborne Respirable Mass and Fibre Concentrations from Soil Samples from Libby, Montana", *Indoor and Built Environment*, Vol 19, No. 2, pp 286-297, August 2009.

Strohmeier, B.R., K.L. Bunker, C.L. Lopano, J.P. Marquis, Jr., J.D. Piasecki, K.E. Bennethum, R.G. White, T.S. Nunney, and R.J. Lee, 'XPS and SEM/STEM Characterization of Silver Nanoparticles Formed from the X-ray-Induced and Thermal Reduction of Silver Behenate', *Microscopy and Microanalysis 2009 Annual Meeting: Microscopy and Microanalysis of Nanostructured Materials*, Richmond, VA, July 26-30, 2009, American Vacuum Society 56<sup>th</sup> International Symposium and Exposition, San Jose, CA, Nov. 2009.

Strohmeier, B.R., J.D. Piasecki, K.L. Bunker, J.L. Sturgeon, R.G. White, and R.J. Lee, "X-ray Photoelectron Spectroscopy (XPS): The Original Nano-Analytical Technique for Materials Surface Characterization", presented at the *Electron Microscopy & Microanalysis Workshop: Problem Solving in the Nanotechnology World*, sponsored by RJ Lee Group, Inc. and Hitachi High Technologies America, Inc., June 16-17, 2009.

Bunker, K.L., D. McAllister, K.A. Allison, K. Wagner, K. Rickabaugh, A.M. Levine, B.R. Strohmeier, R.J. Lee, "TEM and FESEM: The Right Combination for Enhanced Particle Characterization", presented at the *Hitachi/ORNL Workshop on Advanced Electron Microscopy in Materials Science*, Oak Ridge National Laboratory, Oak Ridge, TN, November 18-19, 2008.

Bunker, K.L., M. Sanchez, G. Casuccio, T. Lersch, B. R. Strohmeier, R. J. Lee, "Complementary STEM and SEM Imaging of Nanoparticles in an Ultra-high Resolution, Low kV SEM," presented at *Microscopy & Microanalysis 2008 Meeting*, Albuquerque, NM, August 2008.

Huntington, C., B. Clark, J. Ptasienski, K.L. Bunker, B.R. Strohmeier, R.J. Lee, "A New Method for Fracturing Mineral Particles for Cross-Sectional FESEM Analysis", presented at the *Microscopy & Microanalysis 2008 Meeting*, Albuquerque, NM, August 2008.

Bunker, K.L., T.L. Lersch, D. McAllister, K.A. Allison, K.E. Harris, K. Wagner, K. Rickabaugh, A.M. Levine, B.R. Strohmeier, R.J. Lee, "TEM and FESEM: The Right Combination for Enhanced Particle Characterization", presented at the *Microscopy & Microanalysis 2008 Meeting*, Albuquerque, NM, August 2008.

Sanchez, Matt S., Richard J. Lee, and D. R. Van Orden, "Extinction Characteristics of Six Tremolites with Differing Morphologies", *Microscope*, Vol. 56, No. 1, pp 13-27, 2008.

Lee, R.J., B.R. Strohmeier, K.L. Bunker, D.R. Van Orden, "The Challenge of Naturally Occurring Asbestos - Characterization of Amphibole Particles in Mixed Mineral Dust", 2008 ASTM Johnson Conference on Critical Issues in Monitoring Asbestos, Burlington, VT, July 2008.

Bunker, K.L., B. R. Strohmeier, K. E. Harris, R. Hoch, R. J. Lee, "Complementary TEM and FESEM Characterization of Amphibole Particles in Mixed Mineral Dust from Libby, Montana, U.S.A." presented at Inter/Micro 2008, Chicago, IL, July 2008.

Glenn, R.E., R.J. Lee, L.M. Jastrem, K.L. Bunker, D.R. Van Orden, B.R. Strohmeier, "Asbestos: By Any Other Name, Is It Still?", *Chemical Regulation Reporter*, Vol. 32, No. 21, pp. 22-33, 2008.

Huntington, J.C., J.J. Ptasienski, K.L. Bunker, B.R. Strohmeier, D.R. Van Orden, R.J. Lee, "A New Method for Fracturing Mineral Particles for Cross-Sectional FESEM Analysis", *Periodico di Mineralogia*, Vol. 77, No. 2, pp. 43-50, 2008.

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R.J. Lee, B.R. Strohmeier, K.L. Bunker, M. Sanchez, D.R. Van Orden, "The Challenge of Naturally Occurring Asbestos - Characterization of Amphibole Particles in Mixed Mineral Dust", Keynote presentation at the 2008 Roy J. Shlemon Specialty Conference on the Geological Assessment of Naturally Occurring Hazardous Substances, AEG Foundation and Association of Environmental & Engineering Geologists, Folsom, CA, June 2008.

Lee, R. J., D. R. Van Orden, "Airborne Asbestos in Buildings", *Regulatory Toxicology and Pharmacology*, Vol. 50, Issue 2, pp. 218-225, 2008.

Lee, R. J., B. R. Strohmeier, K. L. Bunker, D. R. Van Orden, "Naturally Occurring Asbestos – A Recurring Public Policy Challenge," *Journal of Hazardous Materials*, Vol 153, pp.1-21, 2008.

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Van Orden, D. R., K. A. Allison, and R. J. Lee, "Differentiating Amphibole Asbestos from Non-Asbestos in a Complex Mineral Environment," *Indoor and Built Environment*, Vol. 17, pp. 58-68, 2008.

Andreozzi, A., Ballirano, P., Bruni, B.M., Gianfagna, A., Gunter, M.E., Mazziotti-Tagliani, S., Pacella, A., Paoletti, L., Lee, R.J., **Van Orden, D.R.**, and Allison, K. (2007). "Fibrous amphiboles from Biancavilla: Crystal chemistry, environmental aspects, and health studies", *RiMG Amphiboles short course*, Rome, Italy.

Lee, R. J., Strohmeier, B. R., Bunker, K. L., and Van Orden, D. R. (2007). "Naturally Occurring Asbestos – A Recurring Public Policy Challenge", presented at the Geological Society of America Annual Meeting and Exposition, October 29, 2007. *Geological Society of America Abstracts with Programs*, 39, pp. 296.

Lee, R. J., Bowman, G. A., Strohmeier, B. R., Van Orden, D. R. (2007). "Limitations of Current Analytical Protocols as They Relate to Public Policy: The Libby, Montana Puzzle", presented at the 2007 Annual Meeting of the American Industrial Hygiene Association, Philadelphia, PA.

Strohmeier, B. R., K. L. Bunker, K. E. Harris, R. Hoch, and R. J. Lee, "Complementary TEM and FESEM Characterization of Amphibole Particles in Mixed Mineral Dust from Libby, Montana, U.S.A.," *The Microscope*, Vol. 55, No. 4, pp. 173-188, 2007.

Lee, R.J., B.R. Strohmeier, "Asbestos and Other Mineral Fibers: A Roadmap for Scientific Research," Presented at National Institute for Occupational Safety and Health (NIOSH) Public Meeting, Washington, DC, May 2007.

Strohmeier, B. R., K. L. Bunker, K. E. Harris, R. Hoch, and R. J. Lee, "The Database Solution to Particle-by-Particle Analysis of Mixed Mineral Dust," *Microscopy Today*, Vol. 15, No. 6, 44-47, November 2007.

Harris, K. E., K. L. Bunker, B. R. Strohmeier, R. Hoch, and R. J. Lee, "Discovering the True Morphology of Amphibole Minerals: Complementary TEM and FESEM Characterization of Particles in Mixed Mineral Dust," *Modern Research and Educational Topics in Microscopy*, A. Méndez-Vilas and J. Díaz, Eds., Formatex Microscopy Book Series, No. 3, Vol. 2, Formatex Research Center, Badajoz, Spain, pp. 643-650, 2007.

Lee, R. J., Bowman, G. A., Strohmeier, B. R., and **Van Orden, D. R.** (2006). "Naturally Occurring Asbestos: An Alternate Analysis", poster presented at the 2006 Annual Meeting of the Geological Society of America, Philadelphia, PA, October 24, 2006.

Van Orden, D., Lee, R., Badger, S. and Hobbs, G. (2006). "The Importance of Correct Minerals Identification: Application of Mineral Identification to Asbestos Analyses", presented at the Industrial Minerals Association Meeting, Pittsburgh, PA, March 20 – March 22, 2006.

Van Orden, D.R., R.J. Lee, S.R. Badger, "Characterizing Asbestos Fiber Comminution Resulting from Preparation of Environmental Samples," *Powder Technology*, Vol 162, pp 183-189, 2006.

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Van Orden, D.R., R.J. Lee, K.A. Allison, "A Review of the Analysis of Amphibole Fibers," Presented at the 2005 SME Meeting, Salt Lake City, UT, February 2005.

Sahu, S., S.R. Badger, R.J. Lee, N. Thaulow, "Determination of Water-to-Cement Ratio of Hardened Concrete by Scanning Electron Microscopy," *Cement and Concrete Composites*, 2004.

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