Curriculum Vitae

Eric M. Suuberg
Professor of Engineering - Brown University

Education

Sc. D., Chemical Engineering, M.I.T., 1978
S.M., Management Science, M.I.T., 1976
S.B., S.M., Chemical Engineering, S.B. Management Science, M.I.T., 1974

Professional Appointments

Professor of Engineering, Brown University, 1990-present
C.V. Starr Professor of Technology Entrepreneurship 2015-present
Associate Director, Brown Superfund Program, 2005- 2019
Co-Director, Program in Innovation Management and Entrepreneurship (PRIME) 2005-2019
Principal Editor, *Fuel*, 2000-2021
Associate Dean of Engineering, September, 2011- 2012.
Associate Dean of the Faculty, Brown University, 2003-2005
Interim Chair, Department of Psychology, Brown University, 2004-2005
Visiting Professor of Engineering, Tallinn Technical University, Summer 2002
Fulbright Scholar, Tallinn Technical University, Spring, 2001
Visiting Professor, University of Newcastle, Australia, January, 2001
Vice Chancellor's Research Best Practice Fellow, University of Newcastle, Australia, 1995
Associate Professor of Engineering, Brown University, 1984-1990
Visiting Scientist, CNRS, Mulhouse, France, Spring 1988
Assistant Professor of Engineering, Brown University, 1981-1984
Assistant Professor Chemical Engineering, Carnegie-Mellon University, 1977-1981

Publications

Chapters in Books

235. J. Fu, J. W. Rice, E.M. Suuberg, "Phase Behavior and Thermochemical Properties of Polycyclic Aromatic Hydrocarbons and Their Derivatives" Chapter 14 in *Handbook of Polycyclic Aromatic Hydrocarbons- Chemistry, Occurrence and Health Issues*, G. C. Bandeira and H.E. Meneses, Eds., Nova Publishers, New York, 2013.

234. J. W. Rice, J. Fu, E.M. Suuberg, "Thermodynamic and Phase Behavior of Polycyclic Aromatic Hydrocarbon Mixtures, Chapter 6 in *Handbook of Polycyclic Aromatic Hydrocarbons- Chemistry, Occurrence and Health Issues*, G. C. Bandeira and H.E. Meneses, Eds., Nova Publishers, New York, 2013.

233. J. Fu, J. Rice and E.M. Suuberg, "Phase Behavior and Crystal Structure of Binary Polycyclic Aromatic Compound Mixtures" in *Crystallization Processes*, Y. Mastai, Ed. , Chapter 20, pp515-538, Intech Publishing, Rijeka, Croatia, 2012.

232. E.M. Suuberg, Y.Yao, R. Shen, O. Bozkurt and K.G. Pennell, "Modeling Vapor Intrusion Processes and Evaluating Risks Using Subslab Data", in *Environmental Health and Biomedicine*, C.A. Brebbia et al, Eds., pp 115-125, WIT Press, Southampton, UK, 2011.

231. V. Oja and E.M. Suuberg “The Chemistry and Technology of Oil Shale and Its Processing” in *Encyclopedia of Sustainability Science and Technology*, Springer, 2012, updated 2017.

230. K. G. Pennell and E.M. Suuberg “Vapor Transport from Soil and Groundwater: Numerical Modeling Approach” in *Vapor Emission to Outdoor Air and Enclosed Spaces for Human Health Risk Assessment*, S. Saponaro, E. Sezenna, L. Bonomo, Eds., Nova Science Publishers, Hauppauge, NY, Chapter 4, pp 73-90, 2011.

229. V. Oja and E.M. Suuberg “Vapor Liquid Equilibrium in Polycyclic Aromatic Compound Mixtures and in Coal Tars” in *Heavy Hydrocarbon Resources: Characterization, Upgrading and Utilization*, M. Nomura, Ed., American Chemical Society, pp113-122, 2005.

228. E.M. Suuberg, I. Aarna, and I. Milosavljevic, “The Char Residues from Pyrolysis of Biomass- Some Physical Properties of Importance”, *Progress in Thermochemical Biomass Conversion*, A.V. Bridgwater, Ed., pp 1246-1258, Blackwell Science, Oxford, UK, 2001.

227. E.M. Suuberg, "Thermally Induced Changes in Reactivity of Carbons," in *Fundamental Issues in Control of Carbon Reactivity*, J. Lahaye and P. Ehrburger, Eds., p. 269ff, Kluwer Acad. Publ., 1991.

226. R.H. Essenhigh and E.M. Suuberg, "The Role of Volatiles in Coal Combustion," in *Fundamentals of the Physical Chemistry of Coal Combustion,* J. Lahaye and G. Prado, Eds., Nijhoff, Dordrecht, 1987.

225. E.M. Suuberg, "Mass Transfer Effects in Pyrolysis of Coals," in *Chemistry of Coal Conversion*, R. Schlosberg, Ed., Plenum, 1985.

224. E.M. Suuberg, W. A. Peters and J. B. Howard, "A Comparison of the Rapid Pyrolysis of a Lignite and Bituminous Coal," in *Thermal Hydrocarbon Chemistry*, A. Oblad, Ed., ACS Symposium, Ser. No. 183, 239, 1979.

223. W.S. Yu, C. Waide and E.M. Suuberg, "Modeling Studies of Fixed Bed Metal Hydride Storage Systems," in *Hydrogen Energy*, N.Veziroglu, Ed., Plenum, 1976 .

Refereed Journal Publications and Conference Proceedings (since 2012)

222. Zhang, M., Suuberg, E.M. (2023) “Estimation of vapor pressure of perfluoroalkyl substances (PFAS) using COSMOtherm”, *Jl. Hazardous Materials*, *443*, 130185.

221. Xie,S., Suuberg, E.M.,(2022) “Adsorption of Trichloroethylene on Common Indoor Materials Studied Using a Combined Inverse Gas Chromatography and Frequency Response Technique" *Jl. Chromatography A*, *Jl. Chromatography A, 1669,* 462926.

220. Xie,S., Suuberg, E.M.,(2021) “The Effects of Temperature and Relative Humidity on Trichloroethylene Sorption Capacities of Building Materials Under Conditions Relevant to Vapor Intrusion”, *Jl. Hazardous Materials, 401,* 123807.

219. Zhang, M., Yamada, K., Bourguet, S., Guelfo, J., Suuberg, E.M., (2020) “Vapor Pressure of Nine Perfluoroalkyl Substances (PFASs) Determined Using the Knudsen Effusion Method”, *Jl. Chem. Eng. Data, 65*, 2332-2342.

218. Xie,S., Suuberg, E.M., (2020) “Very Low Concentration Adsorption Isotherms of Trichloroethylene on Common Building Materials”, *Building and Environment*, *179*, 106954.

217. Yao, Y., Zuo, J., Luo, J., Chen, Q., Ström, J., Suuberg, E.M., (2020) “An examination of the building pressure cycling technique as a tool in vapor intrusion investigations with analytical simulations” *Jl. Hazardous Materials*, *389*, 121915.

216. Yao, Y., Xiao, Y., Luo J., Wang, G., Ström, J., Suuberg, E.M. (2020) “High Frequency fluctuations of indoor pressure: A potential driving force for vapor intrusion in urban areas”, *Science of the Total Environment*, **710**, March 2020, 136309.

215. G. Wang, S. Ma, J. G.V. Ström, E.M. Suuberg, Y. Yao, L. Zeng (2019) "Investigating two-dimensional soil gas transport of trichloroethylene in vapor intrusion scenarios involving surface pavements using a pilot-scale tank", *Jl. Hazardous Matls.* **371**, 138-145.

214. J. G. V. Ström, Y. Guo, Y. Yao, E.M. Suuberg (2019) "Factors affecting temporal variations in vapor intrusion-induced indoor air contaminant concentrations" *Building and Environment,* **161**, August 2019, 106196.

213. I. Verginelli, Y. Yao, E.M. Suuberg (2019) "Risk Assessment Tool for Chlorinated Vapor Intrusion Based on a Two-Dimensional Analytical Model Involving Vertical Heterogeneity", *Env. Eng. Sci*., **36**, 969-980.

212. C. Culin, K. Tente, A. Konist, B. Maaten, L.Loo, E.M. Suuberg, I. Külaots, (2019) "Reactivities of American, Chinese and Estonian Oil Shale Semi-Coke and Argonne Premium Coal Char Under Oxy-fuel Combustion Conditions, *Oil Shale*, **36**, 353-369.

211. Guelfo, J., L., Marlow, T., Klein, D.M., Savitz, D.A., Frickel, S., Crimi, M., Suuberg, E.M., (2018) "Evaluation and Management Strategies for Per- and Polyfluoroalkyl Substances (PFASs) in Drinking Water Aquifers: Perspectives from Impacted U.S., Northeast Communities", *Environmental Health Perspectives*, **126(6)**, DOI:10.1289/EHP2727

210. Yao, Y., Verginelli, I., Suuberg, E.M., Eklund, B.,(2018) "Examining the Use of US EPA's Generic Attenuation Factor in Determining Groundwater Screening Levels for Vapor Intrusion". *Groundwater Monitoring and Remediation*, **38(2**), 79-89.

209. Yao, Y., Wang, Y., Zhong, Z., Tang, M., Suuberg, E.M. (2017) "Investigating the role of soil texture in vapor intrusion from groundwater sources", *Journal of Environmental Quality*, **46(4),** 776-784.

208. Yao, Y., Verginelli, I., Suuberg, E.M., (2017) "A two-dimensional analytical model of vapor intrusion involving vertical heterogeneity", *Water Resources Res.* **53(5**), 4499-4513.

207. Yao,Y., Mao, F., Ma, S., Yao, Y., Suuberg, E.M., Tang, X. (2017)"Three-Dimensional Simulation of Land Drains as a Preferential Pathway for Vapor Intrusion into Buildings", *Journal of Environmental Quality*, **46(6),** 1424-1433, doi:10.2134/jeq2017.05.021

206. Todd McAlary, Tom McHugh, Bart Eklund, Chris Lutes, Eric Suuberg, Heidi Hayes, Kelly G. Pennell, David Folkes, Helen Dawson, Robert Truesdale, Lila Beckley, and Chase Holton, (2016) Comments and Corrections to: "The Emperor's Old Clothes: An Inconvenient Truth About Currently Accepted Vapor Intrusion Assessment Methods," and "Emperor's Old Clothes Revisited," Two Recent Editorials by Mark Kram, *Groundwater Monitoring and Remediation*, **36(3**) 84-87.

205. Yao, Y., Wang, Y., Verginelli, I., Suuberg, E.M., Ye, J. (2016) "Comparison between PVI2D and Abreu-Johnson's Model for Petroleum Vapor Intrusion Assessment", *Vadose Zone Journal*, **15(11)**. DOI: 10.2136/vzj2016.07.0063

204. Yao, Y., Verginelli, I., Suuberg, E.M., (2016)"A two-dimensional analytical model of petroleum vapor intrusion", *Water Resources Research*, **52**, 1528-1539.

203. Verginelli, I., Yao, Y., Suuberg, E.M., (2016) "An Excel((R))-Based Visualization Tool of Two-Dimensional Soil Gas Concentration Profiles in Petroleum Vapor Intrusion" Groundwater *Monitoring and Remediation*, **36**, 94-100.

202. Pennell, K.G., Scammell, M.K., McClean, M.D., Suuberg, E.M., Moradi, A., Roghani, M., Ames, J., Frigulietti, L., Indeglia, P.A., Shen, R., Yao, Y., Heiger-Bernays, W.J., (2016) "Field data and numerical modeling: A multiple lines of evidence approach for assessing vapor intrusion exposure risks" *Sci. of the Total Env*., **556**, 291-301.

201. Verginelli, I., Yao, Y., Wang, Y., Ma, J., Suuberg, E.M. (2016) "Estimating the oxygenated zone beneath building foundations for petroleum vapor intrusion assessment", *Jl. Hazardous Matls*., **312**, 84-96.

200. R. Shen and E.M. Suuberg, (2016) "Impacts of changes of indoor air pressure and air exchange rate in vapor intrusion scenarios", *Building and Environment*, **96,** 178-187.

199. Y. Yao, Y. Wu, E.M. Suuberg, J. Provoost, R. Shen, J. Ma, J. Liu, (2015) "Vapor intrusion attenuation factors relative to subslab and source, reconsidered in light of background data", *Jl. Hazardous Materials*, **286**, 553-561.

198. Y. Yao, Y. Wu, Y. Wang, J.J. Wang, I. Verginelli, T. Zeng, E.M. Suuberg, L. Jiang, Y.Z. Wen, J. Ma, (2015) "A Petroleum Vapor Intrusion Model Involving Upward Advective Soil Gas Flow Due to Methane Generation*", Env. Sci. Tech*., **49,** 11571-11585.

197. J. Rice, J. Fu, E. Sandström, J.C. Ditto, E.M. Suuberg, (2015) "Thermodynamic study of (anthracene plus phenanthrene) solid state mixtures*", Jl. Chemical Thermodynamics*, **90**, 79-86.

196. Y. Yao, Y. Wu, M. Tang, Y. Wang,J.J. Wang, E..M. Suuberg, L. Jiang, J. Liu (2015) "Evaluation of site-specific lateral inclusion zone for vapor intrusion based on an analytical approach", *Jl. Hazardous Materials*, **298**, 221-231.

195. J. Hruljova, N. Savest, A. Yanchilin, V. Oja, E.M. Suuberg, (2014) "Solvent Swelling of Kukersite Oil Shale Macromolecular Organic Matter in Binary Mixtures: Impact of Specifically Interacting Solvents", *Oil Shale*, **31(4),** 365-376.

194. X. Han, I. Kulaots, X. Jiang, E.M. Suuberg, (2014) "Review of Oil Shale Semicoke and its Combustion Utilization", *Fuel,* **126**, 143-161.

193. Y. Yao, F. Yang, E.M. Suuberg, J. Provoost, W. Liu, (2014) "Estimation of Contaminant Subslab Concentration in Petroleum Vapor Intrusion", *J. Hazardous Matls*., **279**, 336-347.; PMID: 25124892

192. R. Shen, K.G. Pennell, E.M. Suuberg (2014) "Analytical Modeling of the Subsurface Volatile Organic Vapor Concentration in Vapor Intrusion", *Chemosphere*, **95**, 140-149. DOI:10.1016/j.chemosphere.2013.08.051. PMCID: PMC3941444

191. R. Shen, E.M. Suuberg (2014) "Analytical Quantification of the Subslab Volatile Organic Vapor Concentration from a Non-Uniform Source*", Environmental Modelling and Software*, **54**, 1-8. DOI 10.1016/j.envsoft.2013.12.007. PMCID: PMC3951510

192. Y. Yao, R. Shen, K.G. Pennell, E.M. Suuberg (2013) "A Numerical Investigation of Oxygen Concentration Dependence on Biodegradation Rate Laws in Vapor Intrusion", *Env. Sci. Process Impacts*, **15(12)**, 2345-2354.DOI:10.1039/c3em00421j. PMCID: PMC3897126

189. R. Shen, K.G. Pennell, E.M. Suuberg (2013) "Influence of Soil Moisture on Soil Gas Vapor Concentration for Vapor Intrusion", *Environmental Engineering Science*, **30**, 628-637. DOI 10.1089/ees.2013.0133, PMCID: PMC3804323

188. K.G. Pennell, M. Thompson, J.W. Rice, L. Senier, P. Brown, E.M. Suuberg (2013) "Bridging Research and Environmental Regulatory Processes: The Role of Knowledge Brokers", *Environmental Science and Technology*, **47,** 11985-11992. DOI 10.1021/es4025244, PMCID: PMC3875357

187. Y. Yao, R. Shen, K.G. Pennell, E.M. Suuberg, (2013)"Examination of the US EPA's Vapor Intrusion Database Based Upon Models" *Environmental Science and Technology*, **47,** 1425-1433. DOI: 10.1021/es304546f, PMCID: PMC3565061

186. M. Perron, R.M. Burgess, E. M. Suuberg, M.G. Cantwell, K. G. Pennell (2013) "Performance of Passive Samplers for Monitoring Estuarine Water Column Concentrations 1. Contaminants of Concern", *Environmental Toxicology and Chemistry*, **32 (10),** 2182-2189. DOI 10.1002/etc.2321, PMCID: PMC3979968

185. M. Perron, R.M. Burgess, E. M. Suuberg, M.G. Cantwell, K. G. Pennell (2013) "Performance of Passive Samplers for Monitoring Estuarine Water Column Concentrations 2. Emerging Contaminants", *Environmental Toxicology and Chemistry*, **32 (10),** 2190-2196. DOI 10.1002/etc.2248, PMCID: PMC4006789

184. Y. Yao, R., Shen, K.G., Pennell, E.M., Suuberg, (2013) "Estimation of Contaminant Subslab Concentration in Vapor Intrusion Including Lateral Source–Building Separation", *Vadose Zone Journal*, **12**. DOI10.2136/vzj2012.0157, PMCID: PMC4006780

183. R. Shen, K.G. Pennell, E.M. Suuberg (2013) ""Modeling Quantification of the Influence of Soil Moisture on Subslab Vapor Concentration", *Environmental Science: Processes and Impacts*, **15**, 1444-1453. DOI: 10.1039/c3em00225j. PMCID: PMC3756691

182. K. G. Pennell, M.K. Scammell, M. D. McClean, J. Ames, B. Weldon, L. Friguglietti, E. M. Suuberg, R. Shen, P. A. Indeglia, W. J. Heiger-Bernays (2013) "Sewer Gas: An Indoor Air Source of PCE to Consider During Vapor Intrusion Investigations", *Ground Water Monitoring & Remediation*, **33,** 119-126. DOI: 10.1111/gwmr.12021. PMCID: PMC3740581

181. Y. Yao, R. Shen, K. G. Pennell, E. M. Suuberg (2013) "A Review of Vapor Intrusion Models", *Environmental Science and Technology***, 47**, 2457-2470. DOI: 10.1021/es302714g. PMCID: PMC3604123

180. K. C. Dannemiller, J. S. Murphy, S. L. Dixon, K. G. Pennell, E. M. Suuberg, D. E. Jacobs, M. Sandel (2013) "Formaldehyde concentrations in household air of asthma patients determined using colorimetric detector tubes", *Indoor Air*, **23(4)**, 285-294. DOI: 10.1111/ina.12024. PMCID: PMC3710296

179. J. Fu and E.M. Suuberg (2013) "Thermochemical and Vapor Pressure Behavior of Anthracene and Brominated Anthracene Mixtures", *Fluid Phase Equilibria*, **342**, 60-70. DOI: 10.1016/j.fluid.2012.12.036. PMCID: PMC3848959

178. Y. Yao, R. Shen, K.G. Pennell, E.M. Suuberg (2013) "Examination of the Influence of Environmental Factors in Contaminant Vapor Concentration Attenuation Factors Using the U.S. EPA's Vapor Intrusion Database", *Environmental Science and Technology***, 47**, 906-913. DOI: 10.1021/es303441x, PMCID: PMC3557812

177. J. Goldfarb, A. D'Amico, C. Culin, E. M. Suuberg, I. Külaots, (2013) "Oxidation Kinetics of Oil Shale Semicokes: Reactivity as a Function of Pyrolysis Temperature and Shale Origin", *Energy and Fuels*, **27**, 666-672. DOI: 10.1021/ef3015052

176. Y. Yao, K.G. Pennell, E.M. Suuberg, (2013) "Simulating the Effect of Slab Features on Vapor Intrusion of Crack Entry", *Building and Environment*, **59**, 417-423. DOI: 10.1016/j.buildenv.2012.09.007, PMCID: PMC3555425

175. Shen, R., Pennell, K.G., and Suuberg, E.M. (2012) "A Numerical Investigation of Vapor Intrusion- The Dynamic Response of Contaminant Vapors to Rainfall Events", *Science of the Total Environment*, **437**, 110-120. PMCID: PMC3756695

174. Hruljova, J., Savest, N., Oja, V. and E.M. Suuberg, (2013) "Kukersite Oil Shale Solvent Swelling in Binary Mixtures", *Fuel*, **105**, 77-82. DOI: 10.1016/j.fuel.2012.06.085

173. Y. Yao, K.G. Pennell, E.M. Suuberg, (2012) "Estimation of Contaminant Subslab Concentration in Vapor Intrusion", *Jl. Hazardous Materials*, **231-232**, 10-17, 2012. PMCID: PMC3439146

172. J. Fu and E.M. Suuberg, (2012) "Vapor Pressure of Three Brominated Flame Retardants Determined via Knudsen Effusion Method" *Environmental Toxicology and Chemistry,* **31**, 574-578.

171. J. Fu and E.M. Suuberg, (2012) "Thermochemical Properties and Phase Behavior of Halogenated Polycyclic Aromatic Hydrocarbons", *Environmental Toxicology and Chemistry*, **31,** 486-493. DOI: 10.1002/etc.1709, PMCID: PMC3641849

Selected Service

- Principal Editor, *Fuel*, 2000-2021
- Member, Merger Committee, Divisions of Fuel and Petroleum Chemistry, American Chemical Society, 2011.
- Chairman, American Chemical Society Division of Fuel Chemistry Storch Award Selection Committee, November 2008- 2010.

- Symposium Co-organizer, Fuel Chemistry Division, American Chemical Society Meeting, March, 2009.
- Advisory Board, Priority Research Center on Energy, University of Newcastle, Australia, 2007-2012.
- Symposium Co-organizer, Environmental Chemistry Division, American Chemical Society Meeting, August, 2007.
- Symposium Co-organizer, Fuel Chemistry Division, American Chemical Society Meeting, August, 2007.
- Trustee, Division of Fuel Chemistry, American Chemical Society, 2002-present.
- Meeting Co-organizer, “Carbon 2004”, July 2004.
- Director-at Large, American Chemical Society Division of Fuel Chemistry, 1995-1997.
- Chair, Public Policy Subcommittee, American Chemical Society Division of Fuel Chemistry, 1992.
- Chairman of the American Chemical Society, Division of Fuel Chemistry- 1991 (Chairman-Elect, 1990).
- Program Chairman and Executive Board Member, Division of Fuel Chemistry, American Chemical Society 1983-87.

Selected Honors

- Selected as a Fellow of the American Chemical Society, August, 2011.
- Awarded an honorary doctorate by Tallinn University of Technology in Estonia, September 2008
- Fulbright Scholar, 2000-2001.
- Recipient of the 1999 H.H. Storch Award for Research in Fuels Chemistry, American Chemical Society.
- Invited Lecturer in Japan, Monbusho, December 1997
- Selected as one of the first Vice Chancellor’s Research Best Practice Fellows, University of Newcastle (Australia), 1995