



David Rothstein, Ph.D., P.G., FACI

EDUCATION

1992-1997	Ph.D., Geology	University of California-Los Angeles
1988-1990	M.S., Geology	Northern Arizona University (Flagstaff)
1982-1986	Certificate in Environmental Studies	University of Wisconsin-Madison
1981-1985	B.S., Geology	University of Wisconsin-Madison

REGISTRATION

Professional Geologist	State of California No. 7168
Professional Geologist	State of Illinois No. 196-001060

WORK EXPERIENCE

President, DRP, a Twining Company (Boulder, Colorado), 2017-present

- * President of firm providing petrographic analysis and consultation for characterization of earth materials and performance of cement-based construction materials, aggregates and natural rock products.

President, DRP Consulting, Inc. (Boulder, Colorado), 1999-2017

- * Principal of firm providing petrographic analysis and consultation for characterization of earth materials and performance of cement-based construction materials, aggregates and natural rock products.

Post-Doctoral Research Fellow, Department of Civil Engineering, Northwestern University (Evanston, Illinois); 1999-2001

- * Research on durability, chemistry and microstructure of cement-based materials.

Consultant in Concrete Technology (Santa Monica, California), 1998-1999

- * Consultant providing petrographic analysis of concrete and construction aggregate performance.

Instructor, Department of Geology, California State University-Dominguez Hills, 1998-1999

- * Instructor for Introductory Geology course.

Project Manager, Carlisle & Anderson, Inc. (Santa Monica, California), 1997-1998

- * Geologic exploration and evaluation of mineral and construction aggregate resources, southeastern California.

Exploration Geologist, Touchstone Resources, World Wide Minerals, Inc., Ontario Ltd., Inc., 1990-1997

- * Geologic, geochemical and geophysical exploration of epithermal gold-silver districts throughout Nevada.

PROFESSIONAL SOCIETIES

American Concrete Institute Member since 2000. Fellow of the Institute. Voting member on Committees on Durability (201), Aggregates (221); Materials Science of Concrete (236); and Plastering (524). Past President of Rocky Mountain Chapter (2005). Co-Chair Fall 2006 Denver National Convention.

American Society of Testing and Materials Member since 1999. Committee C-09 on Concrete and Concrete Aggregates; voting member on sub-committees C 09.20 (Aggregates); C 09.26 (Chemical Reactions); C9.50 (Risk Management for Alkali-Aggregate Reactions); C 09.65 (Petrography), and C 09.69 (Miscellaneous Tests).

Society of Concrete Petrographers Member since 2004.

RILEM Member since 2017, TC 259-ISR, Prognosis of deterioration and loss of serviceability in structures affected by alkali-silica reactions

Mineralogical Society of America Member since 1992.

Geological Society of America Member since 1988.

SELECTED PUBLICATIONS & PRESENTATIONS

- Qiao, C., Hosseinzadeh, N., Suraneni, P., Wei, S., and Rothstein, D., 2021, Petrographically quantifying the damage to field and lab-cast mortars subject to freeze-thaw cycles and deicer application, *Journal of Infrastructure Preservation and Resilience*, 2:9, https://www.springeropen.com/epdf/10.1186/s43065-021-00024-3?sharing_token=6rA5-NgURg3tTUZIJzFmS2_BpE1tBhCbnbw3BuzI2RN-XkE2z8X2Wrpp8VsKYW29OvzpNENDeWpD6kgSl-G4hOiLW8GKcJ2dR8nU-t1GxgeOt3vV0wdYN3v1v5m2ELAKeOETLMetkzyok1_Fsd0ocY5CJmDrkxNb9Dffy2-fg%3D
- Qiao, C., and Rothstein, D., 2021, Developments in quality assurance for concrete pavement mix design, *Concrete Contractor Magazine*, <https://www.forconstructionpros.com/concrete/article/21283184/developments-in-the-quality-assurance-for-concrete-pavement-mix-design-using-petrography-and-fluorescence-microscopy>
- Rothstein, D. and Qiao, C., 2020, Accelerated Expansion Test Sample Report: DRP, *in* Diagnosis and Prognosis of AAR Affected Structures, State of the Art Report of RILEM Technical Committee 259-ISR, p. 309-323.
- Qiao, C., Green, G., Stein, B. and Rothstein, D., 2020, Use of petrographic methods and electrical resistivity to measure potential for residual expansion and damage in ASR affected concrete (accepted to 16th International Conference on Alkali-Aggregate Reactions (ICAAR), Lisbon, Portugal.
- Qiao, C. and Rothstein, D., 2020, Microstructural Evaluation of Durability of Different Cementitious Mixtures in Microbial Induced Corrosion Environments, (accepted for publication), in Seratt, C., Casas, J.R. and Gibert, V. (eds.), XV International Conference of Building Materials and Components (DBMC 2020), Barcelona, Spain.
- Rothstein, D., 2019, Managing Structures Affected by Delayed Ettringite Formation and Alkali-Silica Reaction, *Aspire, The Concrete Bridge Magazine*, Spring 2019, p. 42-43.
- Qiao, C., Green, G. and Rothstein, D., 2019, Using image analysis to compare microscopical methods for measuring damage from alkali-silica reaction, *17th Euroseminar on Microscopy Applied to Building Materials*, University of Toronto, p. 179.
- Rothstein, D., 2019, Using Petrography to Understand Distress in Airfield Pavements, *invited paper presented at 2019 Colorado/Wyoming Annual Meeting of the American Concrete Pavement Association, Denver, Colorado.*
- Carrasquillo, R.L. and Rothstein, D., 2018, Forensic Engineering, A Tool for Solving Problems?, in Liu, R. and Lester, M.P. [eds], *Forensic Engineering 2018—Forging Forensic Frontiers*, American Society of Civil Engineers Proceedings of the Eighth Congress on Forensic Engineering, Austin, Texas, p. 639-647.
- Rothstein, D., 2018, Cracking the Code—Concrete Petrography 101, *invited paper presented at the Nevada Infrastructure Concrete Conference, Reno & Las Vegas, Nevada.*

- Rothstein, D., 2018, New Developments in Concrete Petrography, *invited paper presented at the Colorado Concrete Conference, Lakewood, Colorado.*
- Rothstein, D., 2018, Overview of Delayed Ettringite Formation and Alkali-Silica Reaction, *Aspire, The Concrete Bridge Magazine*, Summer 2018, p. 10-11.
- Rothstein, D., and Stein, B., 2018, Best Practices for Pavement Rehabilitation with Rapid Strength Concrete, *seminar taught at the World of Concrete, Las Vegas, Nevada.*
- Rothstein, D., 2018, Concrete Scaling, *seminar taught at the Colorado Ready Mixed Concrete Association, Durango, Colorado.*
- Rothstein, D., 2017, Concrete Scaling, *seminar taught at the Colorado Ready Mixed Concrete Association, Grand Junction & Glenwood Springs, Colorado.*
- Rothstein, D., 2017, The How's and Why's of Concrete Curing, *Concrete Contractor*, (online at: <http://www.forconstructionpros.com/article/12169059/the-hows-and-whys-of-concrete-curing>).
- Rothstein, D., 2017, Concrete Under The Microscope: Petrographic Methods in Forensic Investigations, *invited paper presented at the University of Texas at Austin Engineering Executive Education Forensics Engineering Conference, Austin, Texas.*
- Rothstein, D., 2017, Concrete Under The Microscope: Early Age Behavior, *seminar taught at the World of Concrete, Las Vegas, Nevada.*
- D'Avela, C., Bao, J., Croxen III, F.W., Downs, R.T., Fickett, S., Rodrigues, H., Rothstein, D., and Thompson, J.J., 2016, Preliminary Method to Determine CO₂ Sequestration in Cementitious Units, *The Masonry Society Journal*, v. 34, no. 1, p. 19-28.
- Rothstein, D., 2016, Concrete Under The Microscope: Durability, *seminar taught at the World of Concrete, Las Vegas, Nevada.*
- Rothstein, D., 2015, Concrete Petrography, *Cement and Its Applications*, No. 6, p. 82-91 [in Russian].
- Basham, K., and Rothstein, D., 2015, Combining Engineering and Laboratory Methods to Troubleshoot Problems with Slabs, *seminar taught at the World of Concrete, Las Vegas, Nevada (Also presented in 2016 World of Concrete).*
- Rothstein, D., 2015, Troubleshooting Concrete Construction with Petrography and Other Lab Tests, *seminar taught at the World of Concrete, Las Vegas, Nevada.*
- Rothstein, D., 2015, Using Petrography to Understand and Resolve Scaling Issues, *Concrete Contractor*, (online at: <http://www.forconstructionpros.com/article/12026626/using-petrography-to-understand-and-resolve-scaling-issues>).
- Rothstein, D., 2014, Hot Weather Effects on Concrete, *Concrete Contractor*, (online at: <http://www.forconstructionpros.com/article/11486068/hot-weather-effects-on-concrete>).

- Rothstein, D., 2014, Petrography–What it Can and Cannot Do for Concrete Contractors, *Concrete Contractor*, No. 3, p. 32-37 (online at: <http://www.forconstructionpros.com/article/11248215/petrography-what-it-can-and-cannot-do-for-concrete-contractors>).
- Rothstein, D., 2014, *Energy Dispersive Spectroscopy (Case Studies)*, EDAX Microscopy Essential Knowledge Briefing Series, N. Taylor [ed.], John Wiley & Sons, LTD., West Sussex.
- Rothstein, D., 2013, Descifrando et ADN del Concreto, *invited paper presented at Il Congreso de la Consecution Cemento Panama–Argos, Construyendo un Futuro con Innovación Y Sotenibilidad, Panama City, Panama.*
- Rothstein, D., 2012, Petrografia como instrumento en la ingeniería, *invited paper presented at Foro Argos–360° En Concerto, Bogota, Colombia.*
- Rothstein, D., Carrasquillo, R. L., and Garza, C., 2012, Field and laboratory assessment of cracking damage from alkali-aggregate reactions in concrete slabs on ground, column footings and perimeter foundations, Midwest USA, *Proceedings, 14th International Conference on Alkali-Aggregate Reactions (ICAAR)*, Austin, Texas.
- Rothstein, D., 2012, Case Studies of Physical Salt Attack in the Southwestern United States, *invited paper presented at ACI 201 (Durability) Technical Session on Physical Salt Attack on Concrete*, ACI Spring Convention, Dallas, Texas.
- Rothstein, D., and Bates, C., 2011, Case Study of Alkali-Silica Reaction and Freeze-Thaw Damage in a Post-Tensioned Municipal Water Storage Tank, *invited paper presented at ACI 201 (Durability) Technical Session on Multi-Type Durability Attack*, ACI Fall Convention, Cincinnati, Ohio.
- Sujjavanich, S., Suwanvitaya, P., and Rothstein, D., 2011, Investigation of ASR in Mass Concrete Structures: A Case Study, *in* Cheung, S. O., Yazdani, F., Gharfoori, N., and Singh, A. [eds.], *Modern Methods and Advances in Structural Engineering and Construction*, ISEC-6, Zurich.
- Basham, K., and Rothstein, D., 2011, Avoid surface defects on interior slabs, *Concrete Contractor*, No. 3, p. 32-37 (online at: <http://www.forconstructionpros.com/print/Concrete-Contractor/Features/Avoid-Surface-Defects-on-Interior-Slabs/7FCP20684>)
- Basham, K., and Rothstein, D., 2011, Avoid surface defects on exterior slabs, *Concrete Contractor*, No. 2, p. 32-37 (online at: <http://www.forconstructionpros.com/print/Concrete-Contractor/Features/Avoid-Surface-Defects-on-Exterior-Slabs/7FCP20292>)
- Carrasquillo, R. and Rothstein, D., 2011, Performance Based DOT Specifications and Testing to Determine Acceptability: Case Studies, *invited paper presented at ACI 201 (Durability) and 236 (Materials Science of Concrete) Technical Session on Performance-Based Specifications*, ACI Spring Convention, Tampa Bay.
- Carrasquillo, R. and Rothstein, D., 2010, Importance of Understanding Damage Mechanisms in Developing Repair Strategies, *invited paper presented at ACI 201 (Durability) Technical Session*, ACI Fall Convention, Pittsburgh.

- Rothstein, D., 2009, Using Petrography to Troubleshoot Concrete Construction, *National Ready Mix Concrete Association Concrete Technology Webinar Series, Silver Spring, Maryland.*
- Rothstein, D., 2009, Use and Abuse of Concrete Petrography in Troubleshooting Concrete Construction, *seminar taught at the World of Concrete, Las Vegas, Nevada.*
- Rothstein, D., 2008, Value of Petrography as a Tool for Evaluating the Quality of Concrete in a Structure, *invited paper presented at the Seminario de la Beca for the Congreso Puertorriqueño del Hormigón, San Juan, Puerto Rico.*
- Rothstein, D., 2008, Petrographic Investigations of Concrete Deterioration, *invited paper presented at the Rocky Mountain Chapter International Concrete Repair Institute, Denver, Colorado.*
- Rothstein, D., 2008, Use and Abuse of Concrete Petrography in Troubleshooting Concrete Construction, *seminar taught at the World of Concrete, Las Vegas, Nevada.*
- Rothstein, D., 2008, Use of Petrography to Troubleshoot Concrete Construction, *invited paper presented at the 44th Annual Quality Concrete School, New Mexico Technical State University, Las Cruces, New Mexico.*
- Rothstein, D., 2007, Petrographic analysis for concrete pavements, *invited paper presented at the Colorado/Wyoming American Concrete Pavement Association, Greeley, Colorado.*
- Rothstein, D., 2007, Using petrography to evaluate construction defects, *invited paper presented at the Arizona Chapter American Concrete Institute, Phoenix, Arizona.*
- Rothstein, D. and Carrasquillo, R. L., 2006, Internal expansion mechanisms and damage in concrete: A case study, *Proceedings of the 28th International Conference on Cement Microscopy, Denver, Colorado, p. 128-140.*
- Rothstein, D., 2006, Petrography as a tool for investigating and troubleshooting concrete in service: Case Studies, *invited paper presented at the Congreso Puertorriqueño del Hormigón, San Juan, Puerto Rico.*
- Rothstein, D., Kachlakev, D., and Pal, N., 2005, Plaster durability in pool environments, *Proceedings of the 27th International Conference on Cement Microscopy, Victoria, British Columbia.*
- Rothstein, D., Carrasquillo, R. L., Garner, A., and Baykal, M., 2004, Case Study of Cracking in Architectural Precast Concrete, *invited paper presented at ACI 201 (Durability) Technical Session, ACI Fall Convention, San Francisco.*
- Garner, A., Carrasquillo, R. L., and Rothstein, D., 2004, Investigations of Alkali Silica Reaction (ASR) in Residential Foundations, *Proceedings of the Texas State Conference of the American Society of Civil Engineers, South Padre Island, Texas.*
- Rothstein, D. A., and Manning, C. E., 2003, Geothermal gradients in continental magmatic arcs: Constraints from the eastern Peninsular Ranges batholith, Baja California, Mexico, *in Johnson, W. E., Paterson, S. R., Fletcher, J. M., Girty, G. H., Kimbrough, D. L., and Martin-Barajas, A.,*

- editors, *Tectonic evolution of northwestern Mexico and the southwestern USA*: Boulder, Geological Society of America, p. 337-354.
- Thomas, J. J., Rothstein, D., Jennings, H. M., and Christensen, B. J., 2003, Effect of hydration temperature on the solubility behavior of Ca-, S-, Al-, and Si-bearing solid phases in Portland cement pastes: *Cement and Concrete Research*, Vol. 33, p. 2037-2047.
- Rothstein, D., 2003, Role of petrographic examination in evaluating durability of concrete in sulfate environments, *invited paper presented at 2003 Colorado Concrete Conference*, Denver, Colorado.
- Jennings, H. M., Thomas, J. J., Rothstein, D., and Chen, J. J., 2002, "Cement Paste as a Porous Material," in *Handbook of Porous Solids* [Chapter 6.11], edited by F. Schuth, K. Sing, and J. Weitkamp; H.M. Wiley-VCH, 5, p. 2971-3028.
- Rothstein, D., 2002, Residential Sulfate Attack Litigation in California, *invited paper presented at Rocky Mountain Chapter of the American Concrete Institute*, Denver, Colorado.
- Rothstein, D., Thomas, J.J., Christensen, B.J., and Jennings, H.M., 2002, Solubility behavior of Ca, S, Al- and Si-bearing solid phases in Portland cement pore solutions as a function of hydration time, *Cement and Concrete Research*, Vol. 32, p. 1663-1671.
- Rothstein, D., 2001, Geochemical characterization of efflorescent mineralization, *invited paper presented at semi-annual meeting of the American Concrete Institute*, session on Physical Salt Attack, Dallas, Texas.
- Rothstein, D., Thomas, J. J., Christensen, B. J., and Jennings, H. M., 2001, Pore solution chemistry of Portland cement pastes: Influence of temperature on the system CaO-Na₂O-K₂O-Al₂O₃-SO₄-H₂O, [abstract], *American Ceramic Society Bulletin*, Vol. 80, No. 4, p. 182.
- Rothstein, D., Chen, J. J., Thomas, J. J., and Jennings, H. M., 2001, Early measurement of concrete deterioration by the deformation mapping technique, *Proceedings of the Third International Conference on Concrete Under Severe Conditions*, Banthia, N., Sakai, K., and Gjørsv, O.E. [eds.], University of British Columbia, Vancouver, Canada, p. 1530-1537.
- Ray, J.A. and Rothstein, D., 2001, Applications of chemical petrography to assessing concrete durability—A review, *invited paper presented at the Transportation Research Board Annual Meeting*, Washington, D.C.
- Chen, J. J., Rothstein, D., Thomas, J. J., and Jennings, H. M., 2001, *Application of the Deformation Mapping Technique to Assess Deterioration in Cement-based Materials*: *Journal of the Transportation Research Board*, v. 1775, p. 28-35.
- Axen, G.J., Grove, M., Stockli, D., Lovera, O.M., Rothstein, D.A., Fletcher, J.M., Farley, K., and Abbott, P.L., 2000, Thermal evolution of Monte Blanco dome: Low-angle normal faulting during Gulf of California rifting and late Eocene denudation of the eastern Peninsular Ranges: *Tectonics*, v. 19, p. 197-212.

- Rothstein, D., Thomas, J. J., Christensen, B. J., and Jennings, H. M., 2000, Pore solution chemistry in mature Portland cement pastes [abstract], American Ceramic Society Bulletin, v. 79, No. 4, p. 292.
- Chen, J. J., Rothstein, D., Thomas, J. J., and Jennings, H. M., 2000, A novel technique for quantifying damage in cementitious materials [abstract], 102nd Annual Meeting of the American Ceramic Society, p. 296.
- Rothstein, D. A., Grove, M., and Manning, C. E., 1995, Role of the Main Gulf Escarpment in the denudation of the east-central Peninsular Ranges batholith, Baja California, Mexico: Insights from high resolution $^{40}\text{Ar}/^{39}\text{Ar}$ thermochronology: [abstract] Fall Meeting of the American Geophysical Union.
- Rothstein, D. A., and Manning, C. E., 1995, Compositional variations in metamorphic rocks from different crustal levels in the eastern Peninsular Ranges batholith, Baja California, Mexico: [abstract] Third International Meeting on the Geology of the Baja California Peninsula, La Paz, Baja California Mexico.
- Rothstein, D., 1995, Instructor's Resource Manual for Judson, S., and Richardson, S. M., Earth: An Introduction to Geologic Change: Englewood Cliffs, New Jersey, Prentice-Hall, 89 p.
- Rothstein, D. A., Karlstrom, K. E., Hoisch, T. D., and Morrison, J., 1994, Synkinematic contact metasomatism: implications for the timing of pluton emplacement and regional deformation in the Scanlon shear zone, south-eastern California, Journal of Metamorphic Geology, v. 12, p. 709-721.
- Rothstein, D. A., and Hoisch, T. D., 1994, Multiple intrusions and low-pressure metamorphism in the central Old Woman Mountains, southeastern California: constraints from thermal modelling, Journal of Metamorphic Geology, v. 12, p. 723-734.
- Anderson, R. S., Smith, S., Rothstein, D., Murray, L., Hadly, E., Force, C., and Dively-White, S., 1989, The Mid- and Late-Wisconsin pollen stratigraphy of Potato Lake, Coconino County, Arizona: Current Research in the Pleistocene, v. 6, p. 51-54.