

Tongwei Zhang

Professional Summary

January 9, 2013

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Academic Background

B.S. Petroleum and Natural Gas Geology, Northwest University, 1986
M.S. Petroleum Geochemistry, Chinese Academy of Sciences, 1994
Ph.D. Isotope Geochemistry, Chinese Academy of Sciences, 1999
Postdoctoral Senior Research Fellow Chemistry, California Institute of Technology, January 2007

Areas of Expertise

- A. Extensive expertise in geological interpretation of petroleum and natural gas origins and accumulation in sedimentary basins by integrating petroleum and natural gas geochemistry, geology, and basin evolution.
- B. Expertise in shale gas and tight oil geochemical characterization and integration with lithology and pore characterization to evaluate gas and oil storage, petroleum expulsion efficiency, oil saturation and fluid properties.
- C. Expertise in non-hydrocarbon gases (CO₂, H₂S, and N₂) risk prediction prior to drilling, especially H₂S risk prediction from thermochemical sulfate reduction.
- D. Expertise in the application of noble gas geochemistry and fluid inclusions to the reconstruction of oil- and gas-filling history in reservoirs.
- E. Hands-on knowledge and experience with high-temperature and high-pressure gold-tube hydrous pyrolysis, high pressure and temperature gas adsorption, pore characterization with N₂ adsorption and the kinetics of petroleum and gas generation.
- F. Strong skills in gas and organic compound quantification and isotopic composition analysis with GC, GCMS and GC/C/MS (MAT252, MAT251). also experienced with FT-IR/IR, UV, and VG-5400 isotope spectrometer.
- G. Skills in laboratory water-chemistry measurement and formation-water chemistry prediction by using thermodynamic model.

Professional Work Experience

- A. Present Position: Research Associate/Organic Chemist, Bureau of Economic Geology, The University of Texas at Austin (April 2008 - Present).

As PI or Co-PI for several research projects financially supported by ExxonMobil, Shell, ConocoPhillips, and also as one of key researchers of MSRL (Mudrock System Research Laboratories), my research focus is on shale gas and tight oil geochemical characterization and integration with geological elements (lithology, geological facies) and pore characterization to evaluate gas and oil storage, petroleum generation and migration, oil saturation and fluid properties. I also setup a new gas geochemistry laboratory in the Bureau with the Startup Funds provided by Jackson School of Geosciences.

- B. Laboratory Manager and Research Geochemist, Power, Environmental & Energy Research Center (PEER center)
Chemistry and Chemical Engineering Division, California Institute of Technology, Pasadena, CA
(March 2007 - April 2008).

Responsible for geological interpretation of petroleum and natural gas origin and accumulation in sedimentary basins worldwide; research-project, annual-report, final-report, and proposal writing; and effective management of PEER chemistry laboratories.

- C. Postdoctoral Scholar, Chemistry and Chemical Engineering Division, California Institute of Technology, Pasadena, CA
Chemistry and Chemical Engineering Division, California Institute of Technology, Pasadena, CA
(September 2001 - February 2007).

Focus: integrated geological and geochemical tools for petroleum reserves assessment, geochemical methods for petroleum and natural gas exploration, CO₂ origin and accumulation in sedimentary basins, H₂S and CO₂ risk prediction from TSR prior to drilling.

- D. Visiting Scientist, Institute of Petroleum and Organic Geochemistry of Juelich Research Center, Germany (January 1999 - July 1999).

Quantitative investigation of cap-rock sealing properties of oil and gas for providing important parameters of basin modeling; conduction of gas migration in diffusion to evaluate extent of carbon-isotope fractionation of methane on experimental and geological time scales; establishment of mathematical procedure by which the extent of isotopic fractionation can be estimated on the geological time scale.

- E. Professor of Geochemistry, State Key Laboratory of Gas Geochemistry, Lanzhou Institute of Geology, Chinese Academy of Sciences (CAS) (November 1998 - August 2001).

As PI or Co-PI, focused on integrating geological observations and geochemistry of natural gas and sources; established a method of composition analysis for oil/gas inclusions trapped in reservoirs by means of ultraviolet laser ablation; reconstructed oil- or gas-filling history in reservoirs and identified oil/gas-filling stages of the trap by combining fluid-inclusion microthermometry in the Sichuan sedimentary basin, China; conducted field and laboratory measurement of soil gas (including free phase and absorbed phase), soil secondary carbonate, and mercury; established relationship between enrichment of soil secondary carbonate and microseepage hydrocarbon from deep reservoirs; proposed new mechanism of mineralization in soils resulting from hydrocarbon microseepage; built classification of natural gas origins in a depression on the basis of natural gas geochemistry; evaluated a prospective target for unconventional natural gas accumulation within the depression; conducted N₂, CO₂, Hg gas geochemistry and He and Ar noble gas geochemistry in main gas fields of China; discovered close relationship between helium and argon isotopes and fault activity and volcanic activity; developed geochemical criteria to identify mantle-derived CO₂.

Professional Societies

Geochemical Society
American Association of Petroleum Geologists
Geological Society of China
Petroleum Geology Association, Gansu Province, China

Publications

- Lu, J., Cook, P. J., Hosseini, S. A., Yang, C., Romanak, K. D., Zhang, T., Freifeld, B. M., Smyth, R. C., Zeng, H., and Hovorka, S. D., 2012, Complex fluid flow revealed by monitoring CO₂ injection in a fluvial formation: *Journal of Geophysical Research*, v. 117, B03208, doi:10.1029/2011JB008939.
- Ji, L., Zhang, T., Milliken, K., Qu, J., and Zhang, X., 2012, Experimental investigation of main controls to methane adsorption in clay-rich rocks: *Applied Geochemistry*, v. 27, p. 2533–2545.
- Zhang, T., Ellis, G. S., Ruppel, S. C., Milliken, K., and Yang, R., 2012, Effect of organic-matter type and thermal maturity on methane adsorption in shale-gas systems: *Organic Geochemistry*, v. 47, p. 120–131.
- Milliken, K. L., Esch, W. L., Reed, R. M., and Zhang, T., 2012, Grain assemblages and strong diagenetic overprinting in siliceous mudrocks, Barnett Shale (Mississippian), Fort Worth Basin, Texas: *AAPG Bulletin*, v. 96, no. 8, p. 1553–1578.
- Zhang, T., Ellis, G. S., Ma, Q., Amrani, A., and Tang, Y., 2012, Kinetics of uncatalyzed thermochemical sulfate reduction by sulfur-free paraffin: *Geochimica et Cosmochimica Acta*, v. 96, p. 1–17.
- Zhang, Tongwei, Wang, Kang-shi, Ellis, G. S., Walters, C. C., Kelemen, S. R., and Tang, Yongchun, 2008, Geochemical signatures of thermochemical sulfate reduction in controlled hydrous pyrolysis experiments: *Organic Geochemistry*, v. 39, p. 308–328.
- Zhang, Tongwei, Amrani, Alon, Ellis, G. S., Ma, Qisheng, and Tang, Yongchun, 2008, Experimental investigation on thermochemical sulfate reduction by H₂S initiation: *Geochimica et Cosmochimica Acta*, v. 72, p. 3518–3530.
- Ma, Qisheng, Ellis, G. S., Amrani, Alon, Zhang, Tongwei, and Tang, Yongchun, 2008, Theoretical study on the reactivity of sulfate species with hydrocarbons: *Geochimica et Cosmochimica Acta*, v. 72, p. 4565–4576.
- Amrani, Alon, Zhang, Tongwei, Ma, Qisheng, Ellis, G. S., and Tang, Yongchun, 2008, The role of labile sulfur compounds in thermochemical sulfate reduction: *Geochimica et Cosmochimica Acta*, v. 72, p. 2960–2972.
- Zhang, Tongwei, Zhang, Mingjie, Bai, Baojun, Wang, Xianbin, and Li, Liwu, 2008, Origin and accumulation of carbon dioxide in the Huanghua depression, Bohai Bay Basin, China: *AAPG Bulletin*, v. 92, no. 3, p. 341–358.
- Zhang, Tongwei, Geoffrey, S. E., Wang, Kenny, Walters, C. C., Kelemen, S. R., Gillaizeau, Buruno, and Tang, Yongchen, 2007, Effect of hydrocarbon types on thermochemical sulfate reduction: *Organic Geochemistry*, v. 38, no. 6, p. 897–910.
- Yang, R., Zhang, M., and Zhang, T., 2003, Gas geochemistry of fluid inclusions in carbonate reservoirs of southwestern Sichuan Basin: *Acta Sedimentologica Sinica*, v. 21, no. 3, p. 522–527.
- Zhang, Tongwei, and Krooss, Bernhard, 2001, Experimental investigation of carbon isotopic fractionation of methane during gas migration in diffusion through sedimentary rocks: *Geochimica et Cosmochimica Acta*, v. 65, no.16, p. 2723–2742.

Miscellaneous Activities of a Professional Nature

Invited as a reviewer for Marine and Petroleum Geology, Organic Geochemistry, Journal of Petroleum Science & Engineering, Energy and Fuels, *Geochimica et Cosmochimica Acta*, AAPG Bulletin, Geology, Journal of Asian Earth Sciences, Basin Research

Invited as a reviewer for Chinese Science Natural Foundation

Invited as a reviewer for *Acta Sedimentologica Sinica* (China)