

**DR. RICHARD J. LAUB**  
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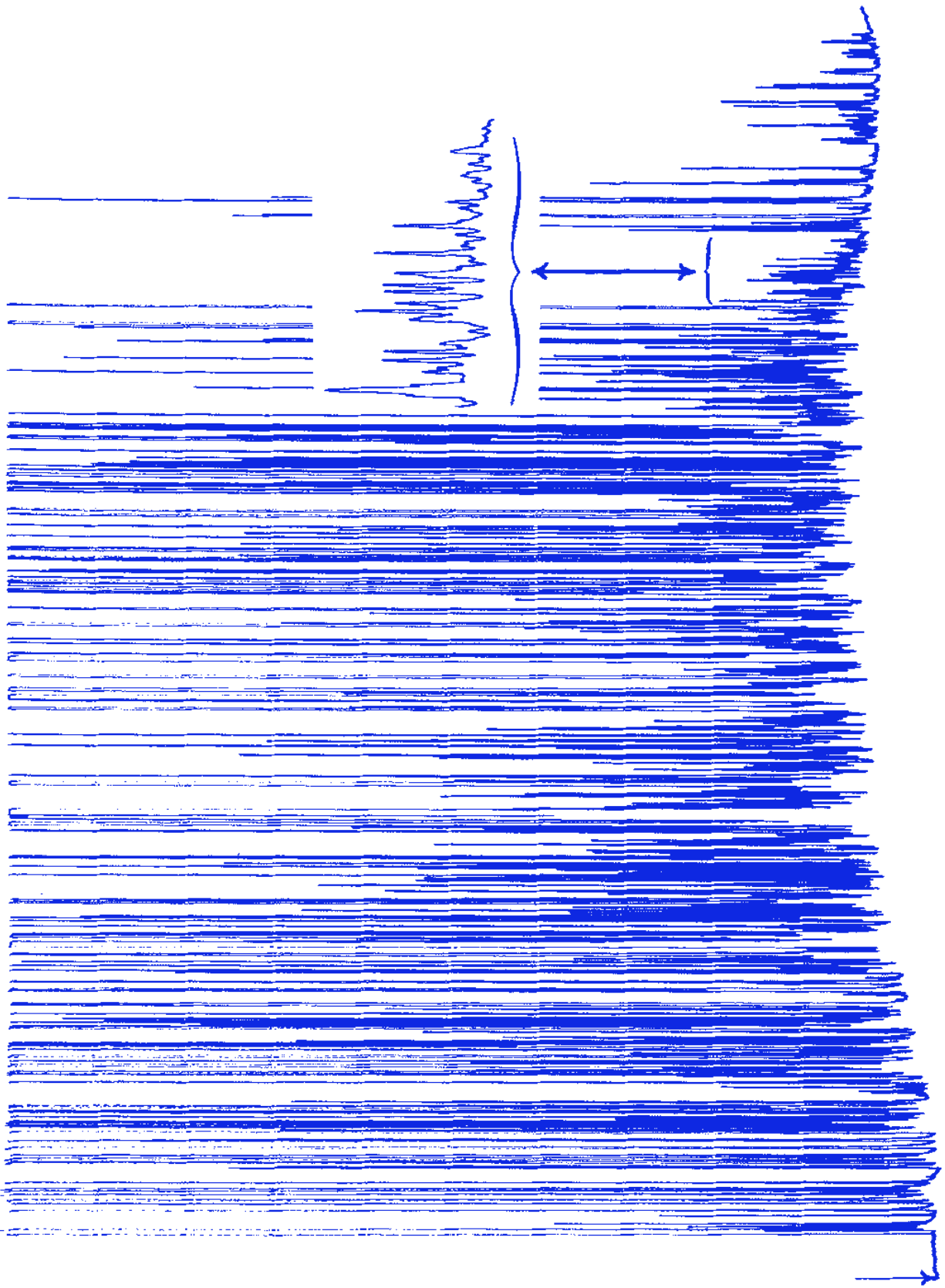
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***Frontispiece: Gas chromatogram of unleaded gasoline (R. J. Laub. In *Physical Methods in Modern Chemical Analysis*; Vol. 3; Academic Press: New York, 1983; Ch. 4).***

# DR. RICHARD J. LAUB

## BIOGRAPHY

## ORIGINAL RESEARCH

Research Papers

Invited Reviews

Books

Book Reviews

Papers Presented at Symposia

Seminars and Colloquia

## SUMMARY OUTLINE OF RESEARCH INTERESTS: ANALYTICAL AND PHYSICOCHEMICAL PROPERTIES OF MULTICOMPONENT SYSTEMS

Physicochemical Aspects of Pure and Blended Substances

Experimental Methods

*Chromatography*

*Dielectric Permittivity*

*Miscellaneous Methods*

Properties of Pure and Blended Gases

Properties of Liquids and Liquid Mixtures

*Alkanes*

*Interactive Liquids*

*Liquid Crystals*

*Polymers*

*Liquid-Crystalline Polymers*

Properties of Adsorptive Solids

Exploitation of Physicochemical Phenomena in Analytical Chemistry

Chromatography

*Gas Chromatography*

*Column-Liquid Chromatography*

*Rotating-Disk Thin-Layer Chromatography*

Electrochemistry

Spectroscopy

## STUDENT THESES

## HONORS AND AWARDS

## GRANTS HISTORY

## PATENTS AND TRADEMARKS

## BIOGRAPHY

Dr. Laub was born in San Francisco, California, in 1945. He received a B.S. (In Chemistry) degree from Regis College (Denver, Colorado) in 1967. Following two years in the Marine Corps, during which time he served in Viet Nam, he returned to California to take an M.S. degree at UCLA with R. L. Pecsok in 1971. He then moved with Pecsok to the University of Hawaii, where he received his Ph.D. degree in 1974.

He spent a brief period as a post-Doctoral fellow with F. W. Karasek at the University of Waterloo (Ontario, Canada) in 1974, and then travelled to Wales to work with J. H. Purnell. He was awarded a Science Research Council Research Fellowship in 1975.

In 1978 he received appointment as an Assistant Professor of Chemistry at The Ohio State University. In 1982 he was appointed Professor at San Diego State University (SDSU). He was elected to membership in the SDSU Molecular Biology Institute in 1983, and the Center for Marine Studies in 1984. He established the Trace Materials Analysis Center (TMAC) at SDSU in 1989, and served as its first Director.

He was appointed a Chartered Chemist (CChem) of the Royal Institute of Chemistry (London) in 1978, and was an Alcoa Foundation awardee in 1983. In 1987 he was elected President of the San Diego Chapter of Sigma Xi. He was elected a Fellow (FRSC) of the Royal Society of Chemistry (London) in 1988.

He left SDSU in 1993 to form a sole proprietorship consultancy in the fields of analytical and physical chemistry. In the Fall of 1995 he incorporated Laub BioChemicals Corporation.

He has authored or coauthored over 125 research papers and reviews, and is coauthor of the seminal work, *Physicochemical Applications of Gas Chromatography* (with R. L. Pecsok; 1978). His research interests have ranged over a variety of topics in analytical, physical, and polymer chemistry; including in particular the physicochemical properties and analytical applications of pure and blended small-molecule as well as polymeric liquid crystals.

Dr. Laub is a former member of the California Faculty Association, the California State Employees Association, the California Teachers Association, the American Association of University Professors, and the National Education Association; and the Southern California Thermal Analysis Society, the American Chemical Society (including the Analytical Division, the Chromatography and Separations Chemistry Subdivision, and the Analytical Division Graduate Education Committee), and the International Union of Pure and Applied Chemistry Working Party IV.2.7 on Polymer Liquid Crystals.

He has also served as Editor of the American Chemical Society Analytical Division *Newsletter*, as Chairman of the Analytical Division Graduate Education Committee, and as President of the San Diego Chapter of Sigma Xi. He has been a member of the Advisory Boards of the *Handbook on Chromatography* (CRC Press) and the *Journal of Liquid Chromatography*, and has served as well on the Review Panel of Environmental Chemistry and Physics (Air Quality), EPA. In addition, he has consulted for Dow Chemical, Hoover Universal (Plastics Division), IBM (Instrument Systems Division), Union Oil of California (UNOCAL Hartley Research Center, Analytical Chemistry Division), Electrosci Corporation, Fletcher Oil and Refining, Paramount Petroleum, and the Giano Corporation.

Dr. Laub has been an amateur (“ham”) radio operator (general class: *WA6BUE*) since 1956. In 1991 he qualified under NASD Series 7 (Federal) and 63 (State of California) licensing examinations with Baraban Securities (San Diego, California) as a registered securities representative (“stock broker”). He was an ardent student of the martial arts (Shaolin Xuan Fa: purple belt; T’ai Chi: yellow sash). He is currently an avid backpacker, fly fisherman, and SCUBA diver (NAUI: OpenWater I and II certifications: 1991; NAUI Advanced certification: 1992; TDI Nitrox and NAUI SM 1600/Mk. 16 Rebreather certifications: 1999; NSS-CDS and NACD full-cave certifications: 2006); and is also an ardent underwater videographer.

## ORIGINAL RESEARCH

### *Research Papers*

1. Laub, R. J. *Gas-Complex Chromatography*. Ph.D. Thesis: University of Hawaii; May 1974.
2. Laub, R. J.; Pecsok, R. L. **Determination of Vertical Ionization Potentials by Gas-Liquid Chromatography**. *Anal. Chem.* **1974**, *46*, 1214-1218.
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### **Invited Reviews**

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2. Laub, R. J.; Pecsok, R. L. **Determination of Second-Interaction Virial Coefficients by Gas-Liquid Chromatography.** *J. Chromatogr.* **1974**, 98, 511-526.
3. Karasek, F. W.; Laub, R. J. **Detection Limits in Instrumental Analysis.** *Res./Devel.* **1974**, 25(6), 36-38.
4. Laub, R. J. **Packings for HPLC.** *Res./Devel.* **1974**, 25(7), 24-28.
5. Laub, R. J. **Isotope Separation.** *Chem 13 News* **1974**, (62), 3-4 (*limited circulation*).
6. Laub, R. J.; Pecsok, R. L. **Study of Charge Transfer Complexation by Gas-Liquid Chromatography.** *J. Chromatogr.* **1975**, 113, 47-68.
7. Laub, R. J. **On the Usefulness of Chemistry.** *Pentacol* **1976**, 14, 15-20 (*limited circulation*).



8. Laub, R. J.; Wellington, C. A. **Study of Complexation Phenomena by Gas-Liquid Chromatography.** In *Molecular Association*; Vol. 2; Foster, R., Ed.; Academic Press: London, 1979; Ch. 3, pp. 171-265.
9. Laub, R. J. **Selected Topics in Contemporary Analytical Gas Chromatography.** *Adv. Instrum.* **1980**, 35(2), 11-20.
10. Laub, R. J. **Recent Advances in Optimization Strategies: Chromatography, Electrochemistry, and Spectroscopy.** *Am. Lab.* **1981**, 13(3), 47-58.
11. Laub, R. J. **Theoretical and Practical Aspects of Open-Tubular Columns in Gas-Liquid Chromatography.** *Trends Anal. Chem.* **1981**, 1, 74-77.
12. Laub, R. J. **Global Optimization Strategy for Gas-Chromatographic Separations.** In *Physical Methods in Modern Chemical Analysis*; Vol. 3; Kuwana, T., Ed.; Academic Press: New York, 1983; Ch. 4, pp. 249-341.
13. Laub, R. J. **Theory of Chromatography.** In *Inorganic Chromatographic Analysis*; MacDonald, J. C., Ed.; Wiley-Interscience: New York, 1985; Ch. 2, pp. 13-186.
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## **Books**

1. Laub, R. J.; Pecsok, R. L. *Physicochemical Applications of Gas Chromatography*; Wiley-Interscience: New York, 1978.

## **Book Reviews**

1. Massaert, D. L.; Dijkstra, A.; Kaufman, L. *Evaluation and Optimization of Laboratory Methods and Analytical Procedures: A Survey of Statistical and Mathematical Techniques*; Elsevier: Amsterdam, 1978. *J. Chromatogr.* **1979**, 175, 225.
2. Kremmer, T.; Boross, L. *Gel Chromatography*; Wiley-Interscience: Chichester, England, 1979. Yau, W. W.; Kirkland, J. J.; Bly, D. D. *Modern Size-Exclusion Liquid Chromatography*; Wiley-Interscience: New York, 1979. *J. Am. Chem. Soc.* **1980**, 102, 7172.
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### ***Papers Presented at Symposia***

1. Laub, R. J.; Purnell, J. H. **Criteria for Use of Mixed Solvents in Gas-Liquid Chromatography.** Presented at the *Tenth International Symposium on Advances in Chromatography*: Munich, West Germany; November 1975.
2. Al-Thamir, W. K.; Laub, R. J.; Purnell, J. H. **Gas Chromatographic Separation of All C1-C4 Hydrocarbons by Multi-Substrate Gas-Solid-Liquid Chromatography.** Presented at the *Twelfth International Symposium on Advances in Chromatography*: Amsterdam, The Netherlands; November 1977.
3. Laub, R. J. **Optimization Strategies for Chromatographic Separations.** Presented at the *Gordon Conference on Separation and Purification*: New London, New Hampshire; August 1978.
4. Anderson, L. B.; Laub, R. J. **Optimization of Electrochemical Separations.** Presented at the *Eleventh Central Regional Meeting of the American Chemical Society*: Columbus, Ohio; May 1979.
5. Gelles, S. H.; Bhat, B. N.; Laub, R. J. **Phase Separation in Transparent Liquid-Liquid Miscibility Gap Systems.** Presented at the *Fluids Experiment Systems Symposium (NASA)*: University of Alabama, Huntsville, Alabama; July 1979.

6. Laub, R. J. **Rotating-Disk Thin-Layer Chromatography.** Presented at the *Gordon Conference on Separation and Purification*: New London, New Hampshire; August 1979.
7. Laub, R. J. **Basic Liquid Chromatography.** Presented at the *First Annual Chromatography Symposium of the Central Ohio Chromatography Association*: Columbus, Ohio; September 1979.
8. Laub, R. J. **Solvent Optimization in HPLC.** Presented at the First Annual Chromatography Symposium of the Central Ohio Chromatography Association, Columbus, Ohio, September 1979.
9. Laub, R. J.; Roberts, W. L. **Use of Mixed Liquid-Crystal Phases for Enhanced Gas-Chromatographic Separation of Polycyclic Aromatic Hydrocarbons: Preliminary Studies with Liquid Crystals.** Presented at the *Fourth International Symposium on Polynuclear Aromatic Hydrocarbons*: Columbus, Ohio; October 1979.
10. Laub, R. J. **A Universal Optimization Strategy for Chromatographic Separations.** Presented at the *Thirty-Third Annual American Chemical Society Summer Symposium on Analytical Chemistry*: Durham, North Carolina; June 1980.
11. Laub, R. J. **Recent Advances in Predicted Enhancement of Chromatographic Separations.** Presented at the *Twelfth Annual Ohio Valley Chromatography Summer Symposium*: Hueston Woods, Ohio; June 1980.
12. Laub, R. J. **Separation of Shapely Solutes: Use of Liquid Crystals as GC Stationary Phases.** Presented at the *Second Annual Symposium of the Central Ohio Chromatography Association*: Columbus, Ohio; September 1980.
13. Laub, R. J. **Selected Topics in Contemporary Analytical Gas Chromatography.** Presented at the *Instrument Society of America Analysis Instrumentation Symposium*: Houston, Texas; October 1980.
14. Laub, R. J.; Roberts, W. L.; Smith, C. A. **Use of Mixed Liquid-Crystal Phases for Enhanced Gas-Chromatographic Separation of Polycyclic Aromatic Hydrocarbons. II. Prediction of Retentions with Open-Tubular Columns of High Efficiency with Liquid Crystal Stationary Phases.** Presented at the *Fifth International Symposium on Polynuclear Aromatic Hydrocarbons*: Columbus, Ohio; October 1980.
15. Laub, R. J. **On the Analytical and Physicochemical Properties of Mixtures of Nonelectrolyte Solvents.** Presented at the *Faraday Society Symposium (No. 15) on Chromatography, Equilibria, and Kinetics*: Brighton, England; December 1980.
16. Laub, R. J.; Zink, D. L. **Rotating-Disk Thin-Layer Chromatography: Theory and Practice.** Presented at the *182nd National American Chemical Society Meeting*: New York; August 1981.

17. Laub, R. J. **Mobile Phase Modifiers and Temperature Effects in Liquid Chromatography.** Presented at the *Third Annual Symposium of the Central Ohio Chromatography Association*: Columbus, Ohio; September 1981.
18. Finkelmann, H.; Laub, R. J.; Roberts, W. L.; Smith, C. A. **Use of Mixed Phases for Enhanced Separation of Polycyclic Aromatic Hydrocarbons. III. Phase Transition Behavior, Mass-Transfer Non-Equilibrium, and Analytical Utility of a Mesogen Polymer Solvent with Silicone Diluents.** Presented at the *Sixth International Symposium on Polynuclear Aromatic Hydrocarbons*: Columbus, Ohio; October 1981.
19. Laub, R. J. **Properties of Mixed Non-Electrolyte Solvents.** Presented at the *Twentieth Eastern Analytical Symposium of the American Chemical Society*: New York; November 1981.
20. Laub, R. J. **Systems Optimization Strategies for Gas and Liquid Chromatography.** Presented at the *Ninth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies (FACSS)*: Philadelphia, Pennsylvania; September 1982.
21. Laub, R. J. **Unique Properties of Blended Mesomorphic Solvents in Gas Chromatography.** Presented at the *Twenty-First Eastern Analytical Symposium of the American Chemical Society*: New York; November 1982.
22. Laub, R. J. **Systems of High Efficiency with Concomitant High Selectivity in Open-Tubular Column Gas Chromatography.** Presented at the *185th National American Chemical Society Meeting*: Seattle, Washington; March 1983.
23. Hsu, A.-J.; Laub, R. J.; Madden, S. J. **Solute Retention in Column Liquid Chromatography.** Presented at the *American Chemical Society 1983 Pacific Conference on Chemistry and Spectroscopy*: Pasadena, California; October 1983.
24. Janini, G. M.; Laub, R. J.; Shaw, T. J. **Mesomorphic Polysiloxane (MEPSIL) Solvents for Open-Tubular Column Gas Chromatography.** Presented at the *LabCon West Meeting*: Long Beach, California; May 1984.
25. Apfel, M. A.; Finkelmann, H.; Laub, R. J.; Luhmann, B.-H.; Price, A.; Roberts, W. L.; Shaw, T. J.; Smith, C. A. **Solute-Probe Study of Mesomorphic Polysiloxane (MEPSIL) Solvents by Gas-Liquid Chromatography.** Presented at the *Gordon Conference on Polymeric Liquid Crystals*: New London, New Hampshire; July 1984.
26. Laub, R. J. **Some Fundamental Aspects of Speciation of Propellant Binder Prepolymers.** Presented at the *JANNAF Symposium on Propellant Characterization*: U.S. Air Force Academy, Colorado Springs, Colorado; September 1984.

27. Laub, R. J. **Microbore-Column Liquid Chromatography/Mass Spectrometry.** Presented at the *JANNAF Symposium on Propellant Characterization*: U.S. Air Force Academy, Colorado Springs, Colorado; September 1984.
28. Laub, R. J.; Madden, S. J. **On the Manner of Sorption, and the Form of the Sorption Isotherm, in Column Liquid Chromatography.** Presented at the *Twenty-Third Eastern Analytical Symposium of the American Chemical Society*: New York; November 1984.
29. Laub, R. J. **Some Physicochemical Aspects of Optimization of Chromatographic Separations.** Presented at the *Scientific Computing & Automation Conference and Exposition*: Atlantic City, New Jersey; May 1985.
30. Burrows, R.; Djerki, R. A.; Dobrin, R.; Griffith, J. F.; Laub, R. J.; Russell, S. K. **Some Fundamental Aspects of Speciation of Propellant Binder Prepolymers. II. Gas- and Liquid-Chromatographic and Mass-Spectrometric Characterization of Polystyrenes, Polybutadienes, and Hydroxy-Terminated Butadienes.** Presented at the *JANNAF Symposium on Propellant Characterization*: Johnson Space Center (NASA), Houston, Texas; October 1985.
31. Djerki, R. A.; Dobrin, R.; Laub, R. J. **Some Fundamental Aspects of Speciation of Styrene Polymers.** Presented at the *Twenty-Fourth Eastern Analytical Symposium of the American Chemical Society*: New York; November 1985.
32. Burgoon, K. A.; Griffith, J. F.; Laub, R. J.; Russell, S. K. **Some Fundamental Aspects of Speciation of Propellant Binder Prepolymers. III. Inverse Gas- and Liquid-Chromatographic Characterization of Derivatized and Fractionated Hydroxy-Terminated Polybutadiene.** Presented at the *JANNAF Symposium on Propellant Characterization*: Monterey, California; November 1986.
33. Thompson, S. L.; Burrows, R.; Laub, R. J.; Krisans, S. K. **Conversion of Mevalonic Acid to Cholesterol in vitro by Rat Liver Peroxisomes in the Presence of Cytosol.** Presented at the *Twenty-Sixth Annual Meeting of the American Society of Cell Biology*: Washington, D.C.; December 1986.
34. Djerki, R. A.; Laub, R. J. **Determination of the Dead Volume in Column Liquid Chromatography.** Presented at the *Eleventh International Symposium on Column Liquid Chromatography*: Amsterdam, The Netherlands; June/July 1987.
35. Djerki, R. A.; Laub, R. J. **Determination of Infinite-Dilution Solute Activity Coefficients in Methanol, Water, and Their Mixtures, by Combined Gas-Liquid and Liquid-Liquid Chromatography.** Presented at the *Eleventh International Symposium on Column Liquid Chromatography*: Amsterdam, The Netherlands; June/July 1987.

36. Janini, G. M.; Laub, R. J.; Shaw, T. J. **Solute-Probe Study of Mesomorphic Polysiloxane (MEPSIL) Solvents by Gas-Liquid Chromatography. II. High-Temperature Methoxybiphenyl-Based Nematic Systems.** Presented at the *International Conference on Liquid Crystal Polymers*: Bordeaux, France; July 1987.
37. Laub, R. J. **Activity and Partition Coefficients of Probe-Solutes at Effective Infinite Dilution in Mesomorphic Polysiloxane Solvents.** Presented at the *194th National American Chemical Society Meeting*: New Orleans, Louisiana; August/September 1987.
38. Laub, R. J. **Recent Progress in the Realization of a Set of Standard Stationary Phases for Analytical Gas Chromatography.** Presented at the *194th National American Chemical Society Meeting*: New Orleans, Louisiana; August/September 1987.
39. Laub, R. J. **Definition of a Set of Standard Stationary Phases for Gas-Liquid Chromatography. Predictions, Frustrations, and Triumphs.** Presented at the *Twenty-Sixth Eastern Analytical Symposium of the American Chemical Society*: New York; September 1987.
40. Janini, G. M.; Laub, R. J. **Mesomorphic Polysiloxane (MEPSIL) Stationary Phases for Capillary Gas Chromatography.** Presented at the *Twenty-Sixth Eastern Analytical Symposium of the American Chemical Society*: New York; September 1987.
41. Burrows, R.; Laub, R. J.; Russell, S. K.; Somanathan, R.; Song, D. **Some Fundamental Aspects of Speciation of Propellant Binder Prepolymers. IV. FT-IR, NMR, and GLC Characterization, Including Hydroxyl Content, of Bulk and Fractionated Hydroxy-Terminated Polybutadiene.** Presented at the *JANNAF Symposium on Propellant Characterization*: Laurel, Maryland; October 1987.
42. Laub, R. J.; Tyagi, O. S. **Temperature-Dependence of Polymer Solubility Parameters.** Presented at the *First International Symposium on Polymer Analysis and Characterization*: Toronto, Canada; June 1988.
43. Laub, R. J.; Tyagi, O. S. **Practical Alternative to Activity Coefficient Measurements in Inverse Gas Chromatography.** Presented at the *195th National American Chemical Society Meeting*: Toronto, Canada; June 1988.
44. Todorovic, M.; Kopecni, M. M.; Comor, J. J.; Laub, R. J. **Reversibility of Solvent-Induced Surface Modification of Alumina Adsorbents. Role of the Adsorbed Layer.** Presented at the *Seventeenth International Symposium on Chromatography*: Vienna, Austria; September 1988.
45. Laub, R. J.; Song, D. **Some Fundamental Aspects of Speciation of Propellant Binder Prepolymers. V. Determination of Molecular Weight from Gas-Chromatographic Retentions.** Presented at the *JANNAF Symposium on Propellant Characterization*: White Sands, New Mexico; November 1988.

46. Phleger, C. F.; Laub, R. J. **Depth, Diet, and Fatty Acids in Jamaican Fish.** Presented at the *Twenty-Second Annual Meeting of the Association of Marine Laboratories of the Caribbean*: La Parguera, Lajas, Puerto Rico; May 1989.
47. Phleger, C. F.; Laub, R. J. **Gas-Chromatographic Assay of Lipids in Spawning Pacific Salmon.** Presented at the *Second Annual Biotechnology Symposium and Conference*: Pomona, California; June 1989.
48. Armstrong, H. D.; Laub, R. J. **Liquid-Crystalline Stationary Phases: A "Family"Affair.** Presented at the *First International Symposium on Chromatography*: Mexico City, Mexico; October 1989.
49. Laub, R. J.; Song, D. **Some Fundamental Aspects of Speciation of Propellant Binder Prepolymers. VI. Application of Inverse Gas Chromatography to Lots of Bulk Hydroxy-Terminated Polybutadiene R-45M.** Presented at the *JANNAF Symposium on Propellant Characterization*: Johns Hopkins University, Laurel, Maryland; November 1989.
50. Burrows, R.; Laub, R. J. **Analysis and Characterization of Candelilla Wax by Fourier-Transform Infrared Spectroscopy (FT-IR), Mass Spectrometry (MS), and Capillary Gas-Liquid Chromatography (GLC).** Presented at the *JANNAF Symposium on Propellant Characterization*: Laurel, Maryland; November 1989.
51. Laub, R. J.; Northrop, D. M. **Capillary Electrophoresis Analysis of Propellant Compounds.** Presented at the *JANNAF Symposium on Nitrocellulose*: Tallahassee, Florida; December 1990.

### ***Seminars and Colloquia***

1. Laub, R. J. **Physicochemical Applications of Gas Chromatography.** Presented at the University College of Swansea, Swansea, Wales; January 1975.
2. Laub, R. J. **Physical Chemistry by Gas Chromatography.** Presented at Purdue University, West Lafayette, Indiana; February 1975.
- 3-4. Laub, R. J. **Workshop in Analytical Separations** (two presentations). Conducted at the Agriculture Research Council, Norwich, England; September 1976.
5. Laub, R. J. **Global Optimization in Chromatography.** Presented at The Ohio State University, Columbus, Ohio; January 1978.
6. Laub, R. J. **Global Optimization Strategy for Chromatography.** Presented at the University of Houston, Houston, Texas; January 1978.
7. Laub, R. J. **Global Optimization Strategy for Chromatography.** Presented at Applied Science Laboratories, State College, Pennsylvania; January 1978.

8. Laub, R. J. **Analytical and Physicochemical Applications of Gas Chromatography.** Presented at the University College of Swansea; June 1978.
9. Laub, R. J. **Plenary Optimization Strategy for Chromatographic Separations.** Presented at Battelle Columbus Laboratories, Columbus, Ohio; November 1978.
10. Laub, R. J. **Optimization of the Separation of Almost Anything from Practically Everything Else.** Presented at The Ohio State University, Columbus, Ohio; November 1978.
11. Laub, R. J. **Global Optimization Strategy for Gas and Liquid Chromatography.** Presented at Varian Associates, Walnut Creek, California; January 1979.
12. Laub, R. J. **Utilization of Mixed Mesogenic Phases in Gas Chromatography.** Presented at Dow Chemical Co., Midland, Michigan; February 1979.
- 13-14. Laub, R. J. **Workshop in Gas Chromatography** (two presentations). Conducted at the Procter and Gamble Co., Miami Valley Laboratory, Cincinnati, Ohio; February 1979.
15. Laub, R. J. **Optimization in Separations Science.** Presented at the University of Wisconsin, Madison, Wisconsin; September 1979.
16. Laub, R. J. **Fabrication of Glass-Capillary GC Columns of High Efficiency.** Presented at Dow Chemical Co., Midland, Michigan; October 1979.
- 17-18. Laub, R. J. **Workshop on the Analysis of Acetaldehyde by Gas Chromatography** (two presentations). Conducted at the Hoover Universal Beverage Bottle Co., Columbus, Ohio; October 1979.
19. Laub, R. J. **Computer-Assisted Optimization Strategies.** Presented at IBM, San Jose, California; December 1979.
20. Laub, R. J. **Global Optimization Strategy for Gas and Liquid Chromatography.** Presented at the University of Hawaii, Honolulu, Hawaii; February 1980.
21. Laub, R. J. **Recent Advances in the Use of Mixed Phases in Chromatography.** Presented at Dow Chemical Co., Midland, Michigan; March 1980.
22. Laub, R. J. **Short Course on Introductory Aspects of Gas Chromatography.** Conducted at Dow Chemical Co., Midland, Michigan; August 1980.
23. Laub, R. J. **Forum on Advanced Topics in Gas Chromatography.** Conducted at Dow Chemical Co., Midland, Michigan; August 1980.



24. Laub, R. J. **Sabbatical In-Residence Industrial-Academic Collaboration: Summary of Analytical Studies of R. J. Laub at Dow Chemical.** Presented at Dow Chemical Co., Midland, Michigan; August 1980.
25. Laub, R. J. **Rotating-Disk Thin-Layer Chromatography.** Presented at Dow Chemical Co., Midland, Michigan; November 1980.
26. Laub, R. J. **Contemporary Developments in Gas and Liquid Chromatography.** Presented to the Washington Chromatography Discussion Group, Washington, D.C.; November 1980.
27. Laub, R. J. **Novel Aspects of Chromatographic Analysis.** Presented to the Food and Drug Administration, Washington, D.C.; November 1980.
28. Laub, R. J. **Fifteen Years of Research in Gas Chromatography: A Personalized Overview.** Presented at the Boris Kidric Institute of Nuclear Sciences (VINCA), Belgrade, Yugoslavia; December 1980.
29. Laub, R. J. **Analytical and Physicochemical Studies by Gas Chromatography.** Presented at the University of Cincinnati, Cincinnati, Ohio; January 1981.
30. Laub, R. J. **Recent Developments in Gas- and Liquid-Chromatographic Analysis.** Presented at Dow Chemical Co., Midland, Michigan; March 1981.
31. Laub, R. J. **Preparative-Scale Liquid Chromatography: Rotating-Disk TLC.** Presented at Bowling Green State University, Bowling Green, Ohio; April 1981.
32. Laub, R. J. **Use of Mixed Mesogenic Phases for Enhanced Separation in GLC.** Presented to the Delaware Valley Chromatography Forum, Philadelphia, Pennsylvania; May 1981.
33. Laub, R. J. **Rotating-Disk TLC.** Presented at the Faculty Institute on Chromatographic Analysis, Argonne National Laboratory, Argonne, Illinois; June 1981.
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**SUMMARY OUTLINE OF RESEARCH INTERESTS:  
ANALYTICAL AND PHYSICOCHEMICAL  
PROPERTIES OF MULTICOMPONENT SYSTEMS**

***Physicochemical Aspects of Pure and Blended Substances***

**Experimental Methods**

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# ***Exploitation of Physicochemical Phenomena in Analytical Chemistry***

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## GRANTS HISTORY

### *Air Force (Astronautics Laboratory)*

Laub, R. J. **Fundamental Aspects of Speciation of Propellant Binder Prepolymers:** July 1984-April 1988; \$225,000.

Laub, R. J. **Inverse Gas Chromatography of Hydroxy-Terminated Polybutadiene Prepolymers:** February 1987-January 1990; \$280,993.

### *Department of Energy (Office of Basic Energy Sciences)*

Laub, R. J. **Development and Optimization of Methodologies for Analysis of Complex Hydrocarbon Mixtures:** January 1980-December 1982; \$195,139.

Laub, R. J. **Development and Optimization of Methodologies for Analysis of Complex Hydrocarbon Mixtures:** January 1983-December 1986; \$266,100.

Laub, R. J. **Synthesis and Characterization of Mesomorphic and Other Chromatographic Stationary Phases:** January 1987-December 1989; \$237,000.

Laub, R. J.; Cole, T. C. **Synthesis and Characterization of Mesomorphic and Other Chromatographic Stationary Phases:** January 1990-December 1990; \$80,000.

### *National Science Foundation*

Laub, R. J. **Analytical and Physicochemical Studies by Gas-Liquid Chromatography:** February 1979-January 1982; \$125,729.

Anderson, L. B.; Klapper, M. H.; Laub, R. J.; Meek, D. L. **Permselective Membrane Mass Spectroscopy:** January 1982-December 1982, \$62,500. Matching funds: The Ohio State University Graduate School, \$31,500; The Ohio State University Department of Chemistry, \$31,500. Total of \$125,000.

Laub, R. J. **Analytical and Physicochemical Studies by Gas-Liquid Chromatography:** February 1982-July 1985; \$163,000.

Laub, R. J. **Analytical and Physicochemical Studies by Gas-Liquid Chromatography:** August 1985-June 1988; \$191,086.

Laub, R. J. **Light Microscopy of Mesomorphic Polysiloxane Polymers:** December 1986; \$15,000. Matching funds: San Diego State University College of Sciences, \$5,000; Molecular Biology Institute, \$4,000; H. G. Leberherz, \$4,000. Total of \$28,000.

Ring, M. A.; Cole, T. E.; Laub, R. J. **Purchase of a 300 MHz NMR:** January-June 1993; \$151,644.

### ***Industrial Support***

Laub, R. J. **Equipment and Supplies Grant:** Supelco, Inc.; December 1978-December 1979; \$1,800.

Laub, R. J. **Investigations of Fundamental Aspects of GC and LC Column Technologies:** Dow Chemical Co.; March 1980-June 1981; \$19,500.

Laub, R. J. **Research and Development of Gas Chromatography:** Alcoa Foundation; July 1983-June 1985; \$15,000.

Laub, R. J. **Sol-Gel Coating and Curing of Protective Films for Thermistors:** Alchem Associates; October 1987; \$5,596.

### ***Miscellaneous Support***

Laub, R. J. **Investigations of Thermodynamic Properties of Multi-Component Non-Electrolyte Solutions:** The Ohio State University Small Grants Program; December 1978-December 1979; \$4,140.

Laub, R. J. **Contribution Toward Purchase of MS-9 Mass Spectrometer:** The Ohio State University Graduate School; April 1979; \$3,500.

Laub, R. J.; Phleger, C. F. **Life and Death in Spawning New Guinea Lobsters:** CSU Research, Scholarship, and Creative Activity Award Mini-Grant Program; December 1989-April 1990; \$2,000.

### ***Grants Projects Participation***

Neel, J.; Marshak, C. L. **Molecular Biology Research Experience for Undergraduates:** National Science Foundation; August 1989-July 1990; \$40,001.

## HONORS AND AWARDS

**Research Fellow.** Science Research Council: University College of Swansea, Swansea, Wales; 1975-1978.

**Fellow.** Alcoa Foundation: San Diego State University, San Diego, California; 1983-1985.

**Department Outstanding Undergraduate "Most Influential Professor" Citation.** Department of Chemistry: San Diego State University, San Diego, California; 1987.

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11. Laub, R. J.; assigned to Laub BioChemicals Corporation. **Compositions Containing Synthetic Soil-Extract Materials and Medicaments Based Thereon.** *Patent Application No. US 09/345,865* (July 1, 1999). *Notice of Allowance:* September 26, 2002. *Patent No. US 6,569,416* (May 27, 2003).
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## TRADEMARKS

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