



ANDEEN-HAGERLING, INC.

manufacturers of the world's most accurate
capacitance bridges and standards

31200 Bainbridge Rd, Cleveland, Ohio 44139-2231 U.S.A.
Phone: 440-349-0370 Fax: 440-349-0359 e-mail@andeen-hagerling.com

AH Capacitance/Loss Bridges are used in diverse research fields. This list references selected publications describing research in which AH bridges have been used. The references have been sorted into the following categories:

- 1. DIELECTRIC CHARACTERIZATION**
- 2. CARBON NANOTUBES, NANOWIRES, QUANTUM DOTS**
- 3. DILATOMETRY - (INCLUDES: THERMAL EXPANSION, MAGNETOSTRICTION)**
- 4. FERROELECTRICS**
- 5. BIOPHYSICS**
- 6. LIQUID CRYSTALS**
- 7. LOW TEMPERATURE PHYSICS**
- 8. MAGNETOCAPACITANCE / MAGNETORESISTANCE / MAGNETODIELECTRIC EFFECT**
- 9. MAGNETOMETRY**
- 10. PRESSURE / CAPACITIVE BOLOMETRY**
- 11. SCANNING CAPACITANCE MICROSCOPY (SCM) / SPECTROSCOPY**
- 12. SINGLE ELECTRON TUNNELING (SET)**
- 13. STRUCTURE AND PHASE TRANSITIONS**
- 14. SUPERCONDUCTIVITY**
- 15. SUPERFLUIDS**
- 16. TUNNELING**
- 17. ATOMIC LAYER DEPOSITION (ALD)**
- 18. NANO-FORCE METROLOGY**
- 19. PRECISION POSITIONING**
- 20. SCANNING TUNNELING MICROSCOPY (STM)**
- 21. GLASSES**
- 22. GRAVITY**
- 23. SEMICONDUCTOR TEST**
- 24. ELECTRICAL/CAPACITANCE METROLOGY**

25. MISCELLEANOUS



ANDEEN-HAGERLING, INC.

manufacturers of the world's most accurate
capacitance bridges and standards

31200 Bainbridge Rd, Cleveland, Ohio 44139-2231 U.S.A.

Phone: 440-349-0370 Fax: 440-349-0359 e-mail@andeen-hagerling.com

Selected Publications discussing applications of Andeen-Hagerling Capacitance Bridges and AH1100/AH11A Fused-Silica Standards and Frame along with some side-notes

As of June 2010

1. DIELECTRIC CHARACTERIZATION

“**Accurate Determination of the Audio Frequency Dielectric Properties of a-Quartz and Vitreous Silica**”, Carl Andeen and Donald Schuele, Case Western Reserve University, and Thomas C. Brasco and John Fontanella, U.S. Naval Academy; **1975 Annual Report of the Conference on Electrical Insulation and Dielectric Phenomena**. Based on the paper presented at the 44th Annual Meeting of the Conference, National Institute of Standards and Technology (NIST), Gaithersburg, Maryland, November 3-6, 1975.

“**Effect of OH on The Low-Frequency Dielectric Constant of Vitreous Silica**”, Carl Andeen and Donald Schuele, Case Western Reserve University, and John Fontanella, U.S. Naval Academy; **Journal of Applied Physics**, Volume 45, Issue 3, March 1974, pp. 1071-1074.

“**The Dielectric Properties of As-Received and Gamma Irradiated Fused Silica**”, John Fontanella and Richard L. Johnston, U.S. Naval Academy, and George H. Sigel, Jr., Naval Research Laboratory, and Carl Andeen, Case Western Reserve University; **Journal of Non-Crystalline Solids**, Volume 31, Issue 3, April 1979, pp. 401-414.

Chad R. Snyder and Frederick I. Mopsik worked with E. K. Lin, W. E. Wallace, and W. L. Wu, (all at National Institute of Standards and Technology (NIST)) and C. X. Zhang and R. M. Laine with the University of Michigan, to author, “**Characterization of Epoxy-Functionalized Silsesquioxanes As Potential Underfill Encapsulants**”, (**Materials Research Society Procedures**, San Francisco, California, Volume 519, 1998, pp. 15-20), again using a novel capacitance cell.

Dielectric properties of porous glass, (see “**Modification of Dielectric Properties of Porous Glass By Adsorption of Hydrogen**”, A. Dertinger, M. Schindler, Y. Kondo, F. Pobell, **Physical Review B**, Volume 55, Issue 22, June 1, 1997, pp. 14689-14692). Vycor glass was used as the dielectric between two copper disks with the **AH2500A** measuring the changes made at 1 kHz during the experiment. At the time, the **AH2700A** multi-frequency bridge was not available, and another instrument was used to measure at various frequencies.

John Graham, Marek Kryzeminski, and Zoran Popovic, used an **AH2500A** to accurately measure a known capacitor against an unknown capacitive film in their “**Capacitance Based Scanner For Thickness Mapping of Thin Dielectric Films**”, **Review of Scientific Instruments**, Volume 71, Issue 5, May 2000, pp. 2219-2223. They note that the speed of the **AH2500A** is not sufficient for fast scans and these might take several hours to complete with the bridge. [Author's note: It may be that the **AH2700A** multi-frequency bridge (50 Hz to 20 kHz, with its 3 kHz analog output (down 3db) might improve this condition.]

Several early articles were co-authored by Dr. Carl Andeen and relate to the use of the **AH2xx0** series of capacitance/loss bridges. These are “**Low-Frequency Dielectric Constant of LiF, NaF, NaCl, NaBr, KCl, and KBr**

by the Method of Substitution", Carl Andeen, John Fontanella, Donald Schuele; Physical Review B, Volume 2, Issue 12, December 15, 1970, pp. 5068-5073 and

"Accurate Determination of the Dielectric Constant by the Method of Substitution", Carl Andeen, John Fontanella, Donald Schuele; Review of Scientific Instruments, Volume 41, Issue 11, November 1970, pp. 1573-1576.

"Solubility of Solids In Supercritical Fluids From The Measurements of The Dielectric Constant: Application To CO₂ - Naphthalene", A. Hourri, J. M. St-Arnaud, T. K. Bose; Review of Scientific Instruments, Volume 69, Issue 2, July 1998, pp. 2732-2737.

"Dielectric and Ellipsometric Studies of The Dynamics In Thin Films of Isotactic Poly (Methylmethacrylate) With One Free Surface", J. S. Sharp, J. A. Forrest; Physical Review E, Volume 67, Issue 3, March 2003, p. 031805.

"The Dielectric Response of Chloromethylsilyl and Dichloromethylsilyl Dipolar Rotors on Fused Silica Surfaces", Laura I. Clarke, Dominik Horinek, Gregg S. Kottas, Natalia Varaksa, Thomas F. Magnera, Tanja P. Hinderer, Robert D. Horansky, Josef Michl, John C. Price; Nanotechnology, Volume 13, Number 4, August 2002, pp. 533-540.

"Toroidal Cross Capacitor For Measuring the Dielectric Constant of Gases", Thomas J. Buckley, Jean Hamelin, M. R. Moldover; Review of Scientific Instruments, Volume 71, Issue 7, July 2000, pp. 2914-2921.

"A.C. Dielectric and TSC Studies of Constrained Amorphous Motions in Flexible Polymers Including Poly (oxymethylene) and Miscible Blends", Bryan B. Sauer, Peter Avakian, Edmund A. Flexman, Mimi Keating, Benjamin S. Hsiao, Ravi K. Verma; Journal of Polymer Science Part B: Polymer Physics, Volume 35, Issue 13, December 7, 1998, pp. 2121-2132.

"High-Accuracy Data for the Metering of the Heating Value of Natural Gas via In-Pipeline Measurements", M. Moldover, T. J. Buckley; NIST, 2002.

"Evolution of the Dynamics in 1,4-Polyisoprene from a Nearly Constant Loss to a Johari-Goldstein β -Relaxation to the α -Relaxation", C. M. Roland, M. J. Schroeder, J. J. Fontanella, K. L. Ngai; Macromolecules, Volume 37, Number 7, April 6, 2004, pp. 2630-2635.

"Reference Values of the Dielectric Constant of Natural Gas Components Determined with a Cross Capacitor", M. R. Moldover and T. J. Buckley; International Journal of Thermophysics, Volume 22, Number 3, May 2001, pp. 859-885.

"Magnetic Field Effect and Dielectric Anomalies at the Spin Reorientation Phase Transition of GdFe₃ (BO₃)₄", F. Yen, B. Lorenz, Y. Y. Sun, C. W. Chu, L. N. Bezmaternykh, A. N. Vasiliev; Physical Review B, Volume 73, Issue 5, February 2006, p. 054435.

"Low Temperature Dielectric Anomalies in HoMnO₃: The Complex Phase Diagram", F. Yen, C. R. dela Cruz, B. Lorenz, Y. Y. Sun, Y. Q. Wang, M. M. Gospodinov, C. W. Chu; Physical Review B, Volume 71, Issue 18, May 2005, p. 180407.

"Crystallinity and Dielectric Properties of PEEK, poly(ether ether ketone)", T. W. Giants; IEEE Transactions on Dielectrics and Electrical Insulation, Volume 1, Issue 6, December 1994, pp. 991-999.

"Thermally Stimulated Current Technique to Evaluate Polymer Degradation due to Water Treeing", S. S. Bamji, A. T. Bulinski, Y. Chen; IEEE Transactions on Electrical Insulation, Volume 28, Number 2, April 1993, pp. 299-302.

"New Dielectric Material For Low Temperature Thermometry In High Magnetic Fields", M. M. Maior, S. B. Molnar, Yu M. Vysochanskii, M. I. Gurzan, P. H. M. van Loosdrecht, P. J. E. M. van der Linden, H. van Kempen; Applied Physics Letters, Volume 62, Issue 21, May 24, 1993, pp. 2646-2648.

"A New Multiferroic Material: MnWO₄", O. Heyer, N. Hollmann, I. Klassen, S. Jodlauk, L. Bohaty, P. Becker, J. A.

Mydosh, T. Lorenz, D. Khomskii; **Journal of Physics: Condensed Matter**, Volume 18, Number 39, October 4, 2006, pp. L471-L475.

“Amorphous Dielectric Behavior of Incommensurate Ferroelectric (Pb_{0.45}Sn_{0.55})₂P₂Se₆ at Low Temperatures”, M. M. Maior, S. A. J. Wieggers, F. C. Penning, H. van Kempen, J. C. Maan; **Physical Review B**, Volume 55, Issue 6, February 1, 1997, pp. 3507-3511.

“Interface-Controlled, High-Mobility Organic Transistors”, Oana D. Jurchescu, Mahaita Popinciuc, Bart J. van Wees, Thomas T. M. Palstra; **Advanced Materials**, Volume 19, Issue 5, 2006, pp. 688-692.

“Magnetic Phase Diagrams of The Kagome Staircase Compound Co₃V₂O₈”, F. Yen, R. P. Chaudhury, E. Galstyan, B. Lorenz, Y. Q. Wang, Y. Y. Sun, C. W. Chu; **Physica B: Condensed Matter**, Volume 403, Issues 5-9, April 2008, pp. 1487-1489.

“Dielectric Properties of Vitreous Silica with Various Hydroxyl Concentrations”, Richard van Rooijen, Alexei Marchenkov, Hikota Akimoto, Reijer Jochemsen, Giorgio Frossati; **Journal of Low Temperature Physics**, Volume 110, Numbers 1-2, January 1998, pp. 269-274.

“Dynamics of Glass-Forming Liquids. VIII. Dielectric Signature of Probe Rotation and Bulk Dynamics In Branched Alkanes”, Shervin Shahriari, Andrea Mandanici, Li-Min Wang, Ranko Richert; **The Journal of Chemical Physics**, Volume 121, Issue 18, November 8, 2004, pp. 8960-8967.

“Structural and Electrical Properties of Iron-Containing Aluminosilicate Gel-Derived Pellets”, M. G. Ferreira da Silva, M. A. Valente; **Journal of Sol-Gel Science and Technology**, Volume 26, Numbers 1-3, January 2003, pp. 1091-1096.

“High-Resolution Measurements of the Coexistence Curve Very Near the ³He Liquid–Gas Critical Point”, I. Hahn, M. Weilert, F. Zhong, M. Barmatz; **Journal of Low Temperature Physics**, Volume 137, Numbers 5-6, December 2004, pp. 579-598.

“Relationship Between Magnetic Structure and Ferroelectricity of LiVCuO₄”, Yukio Yasui, Yutaka Naito, Kenji Sato, Taketo Moyoshi, Masatoshi Sato, Kazuhisa Kakurai; **Journal of the Physical Society of Japan**, Volume 77, Number 2, February 2008, p. 023712.

“Switching the Ferroelectric Polarization by External Magnetic Fields in the Spin = 1/2 Chain Cuprate LiCuVO₄”, F. Schrettle, S. Krohns, P. Lunkenheimer, J. Hemberger, N. Büttgen, H.-A. Krug von Nidda, A. V. Prokofiev, A. Loidl; **Physical Review B**, Volume 77, Issue 14, April 2008, p. 144101.

“Dielectric properties of Stycast 1266 over the 0.07-300 K temperature range”, M. Barucci, G. Bianchini, E. Gottardi, I. Peroni, G. Ventura; **Cryogenics**, Volume 39, Number 11, November 1, 1999, pp. 963-966.

“Determination of the Dielectric Constant of Nanoparticles. 1. Dielectric Measurements of Buckminsterfullerene Solutions”, Chad R. Snyder, Jack F. Douglas; **Journal of Physical Chemical B**, Volume 104, 2000, pp. 11058-11065.

“Dielectric Properties of the (CH₃NH₃)₅Bi_{2(1-x)}Sb_{2x}Cl₁₁ Mixed Crystals”, J. Mróz, J. Dziejcz, H. Pykacz; **Acta Physica Polonica A**, Volume 110, Number 4, October 2006, pp. 479-483.

“Magnetoelectric Coupling In The Cubic Ferrimagnet Cu₂OSeO₃”, Jan-Willem G. Bos, Claire V. Colin, Thomas T. M. Palstra; **Physical Review B**, Volume 78, Issue 9, September 2008.

“Dielectric Properties of Polypropylene Containing Nano-Particles”, S. S. Bamji, M. Abou-Dakka, A. T. Bulinski, L. Utracki, K. Cole; **Annual Report Conference on Electrical Insulation and Dielectric Phenomena**, Nashville, Tennessee, October 2005.

“Dielectric coefficient and density of subcooled liquid oxygen”, D. Celika, S.W. Van Scivera; **Cryogenics**, Volume 45, Issue 5, May 2005, pp. 356-361.

“Correlations of structural, magnetic, and dielectric properties of undoped and doped $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ ”, S. Krohns, J. Lu, P. Lunkenheimer, V. Brizé, C. Autret-Lambert, M. Gervais, F. Gervais, F. Bourée, F. Porcher, A. Loidl; **The European Physical Journal B - Condensed Matter and Complex Systems**, Volume 72, Number 2, November 2009, pp. 173-182.

“Dielectric Properties of Polypropylene Loaded with Synthetic Organoclay”, Alexander Bulinski, Soli Bamji, Mahmoud Abou Dakka, Yaoren Chen; **2009 Annual Report – Conference on Electrical Insulation and Dielectric Phenomena**, October 18-21, 2009, Virginia Beach, Virginia.

2. CARBON NANOTUBES, NANOWIRES, QUANTUM DOTS

“Transmission Line Impedance of Carbon Nanotube Thin Films for Chemical Sensing”, G. Esen, M. S. Fuhrer, M. Ishigami, E. D. Williams; **Applied Physics Letters**, Volume 90, Issue 12, March 19, 2007, pp. 123510-123512.

“Measurement of The Quantum Capacitance of Interacting Electrons In Carbon Nanotubes”, S. Ilani, L. A. K. Donev, M. Kindermann, P. L. McEuen; **Nature Physics**, Volume 2, Issue 10, October 2006, pp. 687-691.

“Carbon Nanotube Transistors with 60mV/decade Switching and its Capacitance Measurement”, Yuerui Lu, Hongjie Dai, Yoshio Nishi; **NSTI-Nanotech 2007**, Volume 1, 2007, pp. 57-60.

“Quantum Capacitance Measurement for SWNT FET with Thin ALD High-k Dielectric”, Yuerui Lu, Hongjie Dai, Yoshio Nishi; **65th Device Research Conference**, The University of Notre Dame, South Bend, Indiana, June 18-20, 2007, Conference Digest.

“Measuring the Capacitance of Individual Semiconductor Nanowires for Carrier Mobility Assessment” Ryan Tu, Li Zhang, Yoshio Nishi, Hongjie Dai; **Nano Letters**, 2007, Volume 7, Number 6, pp. 1561-1565.

“Hole Levels in InAs Self-Assembled Quantum Dots”, J. H. Blokland, F. J. P. Wijnen, P. C. M. Christianen, U. Zeitler, J. C. Maan, P. Kailuweit, D. Reuter, A. D. Wieck; **Physical Review B**, June 2007, Issue 75, Issue 23, p. 233305.

“Quantitative Scanning Capacitance Microscopy On Single Subsurface InAs Quantum Dots”, J. Smoliner, W. Brezna, P. Klang, A. M. Andrews, G. Strasser; **Applied Physics Letters**, Volume 92, Issue 9, 2008 p. 092112.

“Diameter-Dependent Electron Mobility of InAs Nanowires”, Alexandra C. Ford, Johnny C. Ho, Yu-Lun Chueh, Yu-Chih Tseng, Zhiyong Fan, Jing Guo, Jeffrey Bokor, Ali Javey; **Nano Letters**, Volume 9, Number 1, 2009, pp. 360-365.

“Dopant Profiling and Surface Analysis of Silicon Nanowires Using Capacitance–Voltage Measurements”, Erik C. Garnett, Yu-Chih Tseng, Devesh R. Khanal, Junqiao Wu, Jeffrey Bokor, Peidong Yang; **Nature Nanotechnology**, Volume 4, Number 5, May 2009, pp. 311-314.

“Measurement of Carrier Mobility in Silicon Nanowires”, Oki Gunawan, Lidija Sekaric, Amlan Majumdar, Michael Rooks, Joerg Appenzeller, Jeffrey W. Sleight, Supratik Guha, Wilfried Haensch; **Nano Letters**, Volume 8, Number 6, 2008, pp. 1566-1571.

“Bottom-up growth of fully transparent contact layers of indium tin oxide nanowires for light-emitting devices”, C. O'Dwyer, M. Szachowicz, G. Visimberga, V. Lavayen, S. B. Newcomb & C. M. Sotomayor Torres; **Nature Nanotechnology**, Volume 4, Issue 4, 2009, pp. 239-244.

3. DILATOMETRY -- (INCLUDES: THERMAL EXPANSION, and MAGNETOSTRICTION)

“Capacitance Cell Measurement of the Out-of-Plane Expansion of Thin Films”, Chad R. Snyder and Frederick I. Mopsik; **National Institute of Standards and Technology (NIST)**, Special Publication 960-7.

Continuing on with examples of dilatometry, in **“A Tilted-Plate Capacitance Displacement Sensor”**, Jan Genossar, and Michael Steinitz, **Review of Scientific Instruments**, Volume 61, Issue 9, September 1990, pp. 2469-2470, these authors continue their earlier work and use a high-precision manual capacitance bridge to measure small changes in displacement of various materials as well as the detection of small changes in angle. Steinitz has added

an **AH2500A** automatic capacitance bridge to his arsenal of tools for his dilatometry work and has developed a high temperature capacitance dilatometer with a resolution of better than 1 Angstrom. This allows users to measure changes of length or position with Angstrom resolution at temperatures of up to 1500 degrees C. (Michael Steinitz, Prof. of Physics at St. Francis Xavier University, Antigonish, Nova Scotia, Canada.)

M. Rotter, H. Muller, and E. Gratz, at the Technical University of Vienna and M. Doerr and M. Loewenhaupt, at the University of Technology Dresden, published "**A Miniature Capacitance Dilatometer For Thermal Expansion and Magnetostriction**", Review of Scientific Instruments, Volume 69, Issue 7, July 1998, pp. 2742-2746. The authors say that capacitance "is one of the most sensitive methods for measuring small length changes of solids." They measure the changes in capacitance with an **AH2500A** bridge.

In "**A Precision Capacitance Cell For Measurement of Thin Film Out-of-Plane Expansion. I. Thermal Expansion**", Chad R. Snyder and Frederick I. Mopsik; Review of Scientific Instruments, Volume 69, Issue 11, November 1988, pp. 3889-3895, use a **AH2500A** bridge in their work involving the measurement of the out-of-plane expansion of thin films, using a 3-terminal parallel plate capacitor cell. They looked at both single crystal <0001> oriented aluminum oxide and at Cyclotene (a thin film polymer made by Dow Chemical).

Another example of the versatility of capacitance as a measuring tool is noted in "**Temperature and Magnetic Field Dependence of The Lattice Constant In The Spin-Peierls Cuprate CuGeO₃ Studied By Capacitance Dilatometry In Fields Up To 16 Tesla**", T. Lorenz, U. Ammerahl, T. Auweiler, B. Büchner, A. Revcolevschi and G. Dhalenne, while at the Universitat zu Koln along with others from Universite Paris-Sud (Physical Review B, Volume 55, Issue 9, March 1, 1997, pp. 5914-5928). The authors note that the Andeen-Hagerling capacitance bridge can principally resolve length changes of less than 0.01 angstrom, though because of mechanical vibrations in the system, one decade of sensitivity is lost. Thus, using a high-resolution capacitance dilatometer, the authors studied the temperature and field dependence of the lattice constant *a* via measurements of the thermal expansion (direct capacitance measurements of length changes with changes in temperature) and the magnetostriction (temperature held constant, length / capacitance changes as the magnetic field was swept).

"**Thermal Expansion and Magnetostriction of Ce_{1-x}La_xRhIn₅**", Shawna Hollen; NHMFL (National High Magnetic Field Laboratory)

"**Magnetic and Magnetoelastic Behavior of Epitaxial TbFe₂/YFe₂ Bilayers**", C. de la Fuente, J. I. Arnaudas, M. Ciria, A. del Moral, C. Dufour, A. Mougin, K. Dumesnil; Physical Review B, Volume 63, Issue 5, February 1, 2001, p. 054417.

"**Thermal Expansion Study of Ordered and Disordered Fe₃A1: An Effective Approach for the Determination of Vibrational Entropy**", Goutam Dev Mukherjee, C. Bansal, Ashok Chatterjee; Physical Review Letters, Volume 76, Issue 11, March 11, 1996, pp. 1876-1879.

The Department of Physics at **Montana State University** has developed a **high-resolution quartz-based capacitive thermal expansion system** using an **AH2500A** bridge along with a quartz dilatometer cell to detect length changes of 0.1 angstrom on a 1 mm long sample. Dr. John Neumeier notes that "this is comparable to detecting a change in length of the distance from New York City to San Francisco of 3 inches!" A sample of their work is described in: "**Negative Thermal Expansion of MgB₂ in the Superconducting State and Anomalous Behavior of The Bulk Grüneisen Function**", J. J. Neumeier, T. Tomita, M. Debessai, J. S. Shilling, P. W. Barnes, D. G. Hinks, J. J. Jorgensen; Physical Review B, Volume 72, Issue 22, December 1, 2001, p. 220505.

"**Capacitance Dilatometry Moves From Cryogenic to High Temperatures**", M. O. Steinitz; Physics in Canada, Volume 62, Number 2, March/April 2006.

"**Anisotropic Thermal Expansion and Magnetostriction of YNi₂B₂C Single Crystals**", S. L. Bud'ko, G. M. Schmiedeshoff, G. Lapertot, P. C. Canfield; Journal of Physics: Condensed Matter, Volume 18, Issue 35, September 2006, pp. 8353-8365.

"**A Versatile and Compact Capacitive Dilatometer**", G. M. Schmiedeshoff, A. W. Lounsbury, D. J. Luna, S. J. Tracy, A. J. Schramm, S. W. Tozer, V. F. Correa, S. T. Hannahs, T. P. Murphy, E. C. Palm, A. H. Lacerda, S. L. Bud'ko, P. C. Canfield, J. L. Smith, J. C. Lashley, J. C. Cooley; Review of Scientific Instruments, Volume 77, Issue 12, December 28, 2006, p. 123907.

“Magnetostriction in the Bose-Einstein Condensate quantum magnet $\text{NiCl}_2\text{-4SC}(\text{NH}_2)_2$ ”, V. S. Zapf, V. F. Correa, C. D. Batista, T. P. Murphy, E. D. Palm, M. Jaime, S. Tozer, A. Lacerda, A. Paduan-Filho; **Journal of Applied Physics**, Volume 101, Issue 9, May 1, 2007, Article 09E106.

“Electronic Restructuring in Shape-Memory Alloys: Thermodynamic and electronic structure studies of the martensitic transition”, J. C. Lashley, R. K. Schulze, B. Mihaila, W. L. Hulst, J. L. Smith, P. S. Risenborough, C. P. Opeil, R. A. Fisher, O. Svietskiy, A. Suslov, A. Planes, L. Manosa, T. R. Finlayson; **Physical Review B**, Volume 75, Issue 20, 2007, p. 205119.

“Correlation Between Magnetostriction and Polarization In Orthorhombic Manganites”, Iliya Radulov, Vassil Lovchinov, Dimitar Dimitrov, Viktor Nizhankovskii; **arXiv:0705.2022** V1, May 14, 2007.

“Simultaneous Measurements of Thermal Expansion and Thermal Conductivity of FRPS By Employing A Hybrid Measuring Head On A GM Refrigerator”, S. Kanagaraj, S. Pattanayak; **Cryogenics**, Volume 43, Issue 8, August 2003, pp. 451-458.

“A Microfabricated Sensor For Thin Dielectric Layers”, P. Fierlinger, R. DeVoe, B. Flatt, G. Gratta, M. Green, S. Kolkowitz, F. Leport, M. Montero Diez, R. Neilson, K. O'Sullivan, A. Pocar, J. Wodin; **Review of Scientific Instruments**, Volume 79, Issue 4, April 2008, p. 045101.

“A Precision Capacitance Cell for Measurement of Thin Film Out-of-Plane Expansion – Part III: Conducting and Semiconducting Materials”, Chad R. Snyder, Frederick I. Mopsik; **IEEE Transactions on Instrumentation and Measurement**, Volume 50, Number 5, October 2001, pp. 1212-1215.

“Direct Measurement of the Thermal Expansion of Liquid ^3He ”, D. L. Sawkey, D. Deptuck, J. P. Harrison; **Journal of Low Temperature Physics**, Volume 116, Numbers 5-6, September 1999, pp. 433-441.

“Pinning of the Vortex System and Magnetostriction of Superconductors”, A. Nabiaek, H. Szymczak, V. V. Chabanenko; **Journal of Low Temperature Physics**, Volume 139, Number 1, April 2005, pp. 309-330.

“Temperature behavior of the protonic conductor $\text{K}_4\text{LiH}_3(\text{SO}_4)_4$ ”, A. Haznar, A. Pietraszko; **Journal of Solid State Chemistry**, Volume 177, Issue 6, June 2004, pp. 2150-2157.

“Ytterbium Divalency and Lattice Disorder In Near-Zero Thermal Expansion YbGaGe ”, C. H. Booth, A. D. Christianson, J. M. Lawrence, L. D. Pham, J. C. Lashley, F. R. Drymiotis; **Physical Review B**, Volume 75, Issue 1, 2007, p. 012301.

Supplementary information for **“Ytterbium Divalency and Lattice Disorder In Near-Zero Thermal Expansion YbGaGe ”**, C. H. Booth, L. Pham, A. Christianson, F. R. Drymiotis, J. Lashley. This electronic supplement contains some extra experimental details.

“Capacitive-based dilatometer cell constructed of fused quartz for measuring the thermal expansion of solids”, J. J. Neumeier, R. K. Bollinger, G. E. Timmins, C. R. Lane, R. D. Krogstad, J. Macaluso; **Review of Scientific Instruments**, Volume 79, Issue 3, March 2008, pp. 033903-033903-8.

“Dimensional Crossover in the Purple Bronze $\text{Li}_{0.9}\text{Mo}_6\text{O}_{17}$ ”, C. A. M. dos Santos, B. D. White, Yi-Kuo Yu, J. J. Neumeier, J. A. Souza; **Physical Review Letters**, Volume 98, Issue 26, June 2007, p. 266405.

“Peculiarities of the magnetic-history-dependent phase in CePtSn ”, Jan Prokleska, Blanka Detlefs, Vladimír Sechovsky, Martin Mísek; **Journal of Magnetism and Magnetic Materials**, Volume 322, Issues 9-12, May-June 2010, pp. 1120-1122.

4. FERROELECTRICS

Donavan Hall, D. P. Young, Z. Fisk, T. P. Murphy, E. C. Palm, A. Teklu, and R. G. Goodrich at the NHFML, Florida State University, Tallahassee, FL, et. al., used a precision capacitance bridge to measure the gap between a torque cantilever device and a fixed/reference plate in **“Fermi Surface Measurements on the Low Carrier Density Ferromagnet $\text{Ca}_{1-x}\text{La}_x\text{B}_6$ and SrB_6 ”**, **Physical Review B**, Volume 64, Issue 23, December 15, 2001, p. 233105.

- “The Anchoring Energy of Nematic Molecules On Magnetic Particles In Some Types of Ferronematics”**, P. Kopcansky, I. Potocova, M. Koneracka, M. Timko, A. G. M. Jansen, J. Jadzyn, G. Czechowski; **10th International Conference on Magnetic Fluids**, Guarujá, São Paulo, Brazil, August 2-6, 2004.
- “Coupling of Magnetic Order, Ferroelectricity, and Lattice Strain in Multiferroic Rare Earth Manganites”**, B. Lorenz, C. R. dela Cruz, F. Yen, Y. Q. Wang, Y. Y. Sun, C. W. Chu; **Proceedings of the ACERS Annual Meeting**, Baltimore, Maryland, April 10-13, 2005.
- “Ferroelectric Transition Induced by the Incommensurate Magnetic Ordering in LiCuVO_4 ”**, Yutaka Naito, Kenji Sato, Yukio Yasui, Yusuke Kobayashi, Yoshiaki Kobayashi and Masatoshi Sato; **Journal of the Physical Society of Japan**, Volume 76, Number 2, February 2007, p. 023708.
- “Successive Magnetic Transitions of the Kagomé Staircase Compound $\text{Co}_3\text{V}_2\text{O}_8$ Studied in Various Magnetic Fields”**, Yukio Yasui, Yusuke Kobayashi, Minoru Soda, Taketo Moyoshi, Masatoshi Sato, Naoki Igawa, Kazuhisa Kakurai; **Journal of the Physical Society of Japan**, Volume 76, Number 3, March 2007, p. 034706.
- “Infrared and THz Studies of Polar Phonons and Improper Magnetodielectric Effect In Multiferroic BiFeO_3 Ceramics”**, S. Kamba, D. Nuzhnyy, M. Savinov, J. Sebek, J. Petzelt, J. Prokleska, R. Haumont, J. Kreisel; **Physical Review B**, Volume 75, Issue 2, January 2007, p. 024403.
- “Pressure Induced Enhancement of Ferroelectricity In Multiferroic RMn_2O_5 ($R=\text{Tb}$, Dy , and Ho)”**, C. R. dela Cruz, B. Lorenz, Y. Y. Sun, Y. Wang, S. Park, S-W. Cheong, M. M. Gospodinov, C. W. Chu; **Physical Review B**, Volume 76, Issue 17, November 2007, p. 174106.
- “Pyroxenes: A New Class of Multiferroics”**, S. Jodlauk, P. Becker, J. A. Mydosh, D. I. Khomskii, T. Lorenz, S. V. Streltsov, D. C. Hezel, L. Bohaty; **Journal of Physics: Condensed Matter**, Volume 19, Issue 43, October 31, 2007, p. 432201.
- “Effect of High Pressure On The Dielectric Properties of Relaxor Compositions $[\text{Pb}(\text{Fe}_{1/2}\text{Nb}_{1/2})\text{O}_3]_{1-x-y}[\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3]_x[\text{BaTiO}_3]_y$ ”**, M. V. Radhika Rao, A. M. Umarji, Y. Kumar, K. K. Jain, E. S. Rajagopal; **Journal of Materials Science Letters**, Volume 16, Number 2, January 1997, pp. 122-125.
- “Structural Phase Transition In D-Benzil Characterised By Capacitance Measurements and Neutron Powder Diffraction”**, D. J. Goossens, Xiaodong Wu, M. Prior; **Solid State Communications**, Volume 136, Issues 9-10, December 2005, pp. 543-545.
- “The Suppression and Recovery of the Ferroelectric Phase in Multiferroic MnWO_4 ”**, R. P. Chaudhury, B. Lorenz, Y. Q. Wang, Y. Y. Sun, C. W. Chu; **Physical Review B**, Volume 77, Issue 10, March 2, 2008, p. 104406.
- “Evolution of Ferroelectric and Antiferromagnetic Phases of TbMn_2O_5 Under High Magnetic Field up to 45 T”**, S. Y. Haam, J. W. Kim, T. H. Kim, Kee Hoon Kim, S. Park, N. Hur, S.-W. Cheong, N. Harrison, A. Migliori; **Ferroelectrics**, Volume 336, Number 1, 2006, pp. 153-159.
- “Switching The Ferroelectric Polarization In The $S=1/2$ Chain Cuprate LiCuVO_4 By External Magnetic Fields”**, F. Schrettle, S. Krohns, P. Lunkenheimer, J. Hemberger, N. Büttgen, H.-A. Krug von Nidda, A. V. Prokofiev, A. Loidl; **Physical Review B**, Volume 77, Issue 14, August 2008, p. 144101.
- “Anomaly in Nonlinear Magnetoelectric Response of YbMnO_3 ”**, U. Adem, M. Mostovoy, N. Bellido, A. A. Nugroho, C. Simon, T. T. M. Palstra; **The European Physical Journal B**, Volume 71, Issue 3, October 2009, pp.393-399.
- “Quantum Criticality In Ferroelectrics”**, S.E. Rowley, L. J. Spalek, R. P. Smith, M. P. M. Dean, G. G. Lonzarich, J. F. Scott, S. S. Saxena; **arXiv:0903.1445**, V1, March 2009.
- “The Structural Phase Transitions in 6CB-Based Ferronematics”**, Natalia Tomasovicova, Martina Koneracka, Peter Kopcansky, Milan Timko, Vlasta Zavisova, Ladislav Tomco, Jan Jadzyn; **Acta Physica Polonica A**, Volume 115, Number 1, January 2009, pp. 336-338.

“Indication For An Antiferromagnetically Ordered State In The Organic Conductor κ -(BETS)₂FeCl₄”, D. Zhanga, K. Andres, Ch. Probst, W. Biberacher, N. D. Kushch, H. Kobayashi; **Solid State Communications**, Volume 115, Issue 8, July 12, 2000, pp. 433–437.

“Studies of Multiferroic System LiCu₂O₂ I Sample Characterization and Relationship between Magnetic Properties and Multiferroic Nature”, Yukio Yasui, Kenji Sato, Yoshiaki Kobayashi, Masatoshi Sato; **Journal of the Physical Society of Japan**, Volume 78, Number 8, August 10, 2009, p. 084720.

“Design and performance of an immersable low-temperature pressure gauge”, M. Barucci, E. Gottardi, I. Peroni, G. Ventura; **Cryogenics**, Volume 40, 2008, pp.437-440.

“Properties of porous glasses with embedded ferroelectric materials”, E. Rysiakiewicz-Pasek, R. Poprawski, J. Polanska, A. Urbanowicz, A. Sieradzki; **Journal of Non-Crystalline Solids**, Volume 352, Issues 40-41, November 1, 2006, pp. 4309-4314.

“Cantilever stress measurements of ferromagnetic monolayers”, D. Sander, J. Kirschner; **Applied Physics A**, Volume 87, Number 3, June 2007, pp.419-425.

5. BIOPHYSICS

In **“Capacitance Cytometry: Measuring Biological Cells One By One”**, L. L. Sohn, O. A. Saley, G. R. Facer, A. J. Beavis, R. S. Allan, D. A. Notterman; **PNAS (Proceedings of the National Academy of Science)**, September 26, 2000, Volume 97, Number 20, pp. 10687-10690.

“Method to Sense Single-Particle Motion Using a Tapered Gap Microcapacitor”, Ruti Kapon, Ilan Sagiv, Guy Ziv, Dan Shahar, and Ziv Reich of Weizmann Institute of Science and Joseph Shappir, Noa Mazorski of The Hebrew University of Jerusalem; **Applied Physics Letters**, Volume 84, Issue 21, May 24, 2004, pp. 4277-4279.0.

“Detecting DNA in Eukaryotic Cells Using an Integrated Microfluidics Electronic Sensor”, L. L. Sohn, O. A. Saleh, G. R. Facer, J. D. Carbeck, A. Beavis, D. A. Notterman; **American Physical Society, Annual March Meeting**, March 20-24, 2000, Minneapolis, Minnesota, abstract #Z13.002.

“Label-Free Electrical Quantification of The Dielectrophoretic Response of DNA”, Anja Henning, Jörg Henkel, Frank F. Bier, Ralph Hölzel; **PMC Biophysics 2008**, Volume 1, #4, November 5, 2008.

6. LIQUID CRYSTALS / POLYMERS

“Kinetic Study of a Cholesteric Liquid Crystal in a Gel Formation” Z. Z. Zhong, D. E. Schuele; **March APS Meeting**, San Jose, California, March 20-24, 1995.

“Disruption of Surface-Induced Smectic Order by Surface Corrugations” Ghanshyam P. Sinha and Charles Rosenblatt, Leonid V. Mirantsev; **Physical Review B**, Volume 65, Issue 4, April 11, 2002, p. 041718.

“Orientational Susceptibility and Elastic Constants Near The Nematic-Isotropic Phase Transition For Trimmers With Terminal-Lateral-Lateral-Terminal Connections”, Daeseung Kang, Milind P. Mahajan, Rolfe G. Petscheck, Charles Rosenblatt, Chaobin He, Puwei Liu, A. C. Griffin; **Physical Review E**, Volume 58, Issue 2, August 1998, pp. 2041-2046.

“Bend Elasticity of Mixtures of V-Shaped Molecules In Ordinary Nematogens”, Mohammad Reza Dodge, Charles Rosenblatt, Rolfe G. Petscheck, Mary E. Neubert, Margaret E. Walsh; **Physical Review E**, Volume 62, Issue 4, October 2000, pp. 5056-5063.

“Smectic Tilt Susceptibility: Anharmonic Behavior In Surface-Induced Smectic Layers Above The Nematic – Smectic-A Transition Temperature”, Zhibin Huang, Giovanni Carbone, Chen Xia, Ghanshyam P. Sinha, Charles Rosenblatt; **Physical Review E**, Volume 72, Issue 2, August 2005, p. 021708.

“Nonstandard Electroconvection In A Bent-Core Nematic Liquid Crystal”, D. Wiant, J. T. Gleeson, N. Éber, K. Fodor-Csorba, A. Jáklí, T. Tóth-Katona; **Physical Review E**, Volume 72, Issue 4, October 27, 2005, pp. 041712-1--041712-12.

“Electric Nusselt Number Characterization of Electroconvection In Nematic Liquid Crystals”, J. T. Gleeson, N. Gheorghiu, E. Plaut; **The European Physical Journal B - Condensed Matter and Complex Systems**, Volume 26, Number 4, April, 2002, pp. 515-520.

“The Anchoring Energy of Liquid Crystal Molecules to Magnetic Particles in HAB-Based Ferronematics”, N. Tomasovicová, M. Koneracká, P. Kopcansky, M. Timko, V. Závísová, A. Vajda, K. Fodor-Csorba, N. Eber, T. Tóth-Katona, J. Jadzyn; **Acta Physica Polonica A**, Volume 113, Number 1, January 2008, p. 591. (**Proceedings of the 13th Czech and Slovak Conference on Magnetism**, Kosice, Slovakia, July 9-12, 2007)

“Splay Elasticity In An Oligomeric Liquid Crystal”, Gregory A. Dilisi, Charles Rosenblatt, Anselm C. Griffin, Uma Hari; **Liquid Crystals**, Volume 8, Number 3, 1990, pp. 437-443.

“Anchoring Strength Coefficient of A Monomer and Its Dimmer At A Polymer-Coated Interface”, Gregory A. Dilisi, Charles Rosenblatt, Robert B. Akins, Anselm C. Griffin, Uma Hari; **Liquid Crystals**, Volume 11, Number 1, 1991, pp. 63-71.

“Bend Elasticity of V-Shaped Molecules Dissolved in a Nematogen”, Mohammad Reza Dodge, Charles Rosenblatt, Rolfe G. Petschek, Mary E. Neubert, Margaret E. Walsh; **Physical Review E**, Volume 62, Issue 4, October 2000, pp. 5056-5063.

7. LOW TEMPERATURE PHYSICS

Many of our bridges are used in the laboratories of universities and private firms. Several articles have been written referencing our bridges for use in low-temperature work where high-resolution capacitive pressure gauges are used. An excellent review article was written by Dwight Adams, (E. Dwight Adams, **“High-Resolution Capacitive Pressure Gauges”**, **Review of Scientific Instruments**, Volume 64, Issue 3, March 1993, pp. 601-611). The **AH2500A** capacitance bridge can be utilized (and is referenced in the article) to measure the capacitance of these gauges. Some specific applications include:

- measurement of sample pressure or density, as in the study of solid helium;
- pressure regulation in a low temperature cell (4.2 K);
- thermodynamic measurements as with studies of solid ^3He ;
- internal and miniature strain gauges within a sample cell;

thermometry:

- melting(curve) pressure thermometry;
- vapor pressure thermometry;
- gas pressure thermometry.

differential and low-pressure gauges:

- studies of critical velocity in superfluid ^4He ;
- equation of state of spin-polarized hydrogen;
- vortex creation in the flow of superfluid ^4He through an aperture;
- flow in superfluid ^3He ;
- magnetically driven superflow and magnetic relaxation in $^3\text{He-A}_1$.

Much work is done in low-temperature thermometry using the Andeen-Hagerling, Inc. capacitance bridge where the use of a capacitive pressure sensor is quite common from 700 mK down to 1 mK and below. An example of a Straty-Adams pressure gauge used as a thermometer in conjunction with the **AH2500A** capacitance bridge is described in **“Unconventional Quantized Vortices: A Study on ^3He and Upt_3 ”** **Dissertation of Rob Blaauwgeers**, University of Leiden, The Netherlands, June 6, 2002, pp. 23-25. In this example, the bridge gives a resolution better than 0.00005 pF, although it is stated that a small interference on the signal limited the precision to this level, with a relative accuracy in the temperature measurement of about 10^{-4} at 2.5 mK. Pressure sensitivity was 10 μbar , and for temperatures between 1 and 250 mK the Greywall temperature scale was used.

The **AH2500A** was also used in “**Pressure Measurements With A Precision of 0.001 Ppm In Magnetic Fields At Low Temperatures**”, Y. Miura, N. Matsushima, T. Ando, S. Kono, S. Inoue, K. Ito, T. Mamiya; **Review of Scientific Instruments**, Volume 64, Issue 11, November 1993, pp. 3215-3218.

A Straty-Adams type strain gauge in a cell monitored ^3He pressure in “**Morphology and Growth Kinetics of ^3He Crystals Below 1 mK**”, V. Tsepelin, H. Alles, A. Babkin, R. Jochemsen, A. Ya, Oarshin, I. Todoshchenko and G. Tvalashvili, in **TKK Report 2001**, ISBN - 951-22-5441-7, where the resolution of the pressure gauge, as measured with a **AH2500A** capacitance bridge, was a few μbar at 35 bars.

The **AH2500A** bridge provided an accuracy of a few μK with 0.1 V excitation in work done at the University of Florida, Physics Department / National High Field Magnetic Laboratory as noted by J. S. Xia, V. Shvarts, E. D. Adams, in “ **^3He Melting Pressure Reduction in High Magnetic Field at Ultra-Low Temperatures**”, as noted in the **1999 NHMFL Annual Research Review**, pp. 194-195.

Related to magnetic fields is the “**Faraday Force Magnetometer for High-Sensitivity Magnetization Measurements at Very Low Temperatures and High Fields**”, Toshiro Sakakibara, Hiroyuki Mitamura, Takashi Tayama and Hiroshi Amitsuka, **Japanese Journal of Applied Physics**, Volume 33, September 15, 1994, pp. 5067-5072. Magnetic moment was measured with a resolution of better than $1 \times 10^{-7} \text{A}\cdot\text{m}^2$ ($1 \times 10^{-4} \text{emu}$). An **AH2500A** bridge measured the capacitance change of a parallel-plate variable capacitor.

“**Investigations of Solid-Liquid Interfaces in Helium at Ultralow Temperatures**”, Viktor Tsepelin, Low Temperature Laboratory, **Helsinki University of Technology**, June 2001.

“**Magnetoelastic Stresses in Rare-Earth Thin Films and Superlattices**”, J. I. Arnaudas, M. Ciria, C. de la Fuente, L. Benito, A. del Moral, R. C. C. Ward, M. R. Wells, C. Dufour, K. Dumesnil, A. Mougín; **Low Temperature Physics**, Volume 27, Issue 4, April 2001, pp. 249-265.

“**Very-Low-Temperature Capacitance Sensors**”, M. Barucci, E. Olivieri, E. Pasca, L. Risegari, G. Ventura, A. Giuliani, G. Jug, M. Pedretti; **TEMPMEKO 2004**, Dubrovnik, Croatia, June 22-25, 2004.

“**Large Magneto-Thermal Effect and The Spin-Phonon Coupling In A Parent Insulating Cuprate $\text{Pr}_{1.3}\text{La}_{0.7}\text{CuO}_4$** ”, X. F. Sun, I. Tsukada, T. Suzuki, Seiki Komiya, Yoichi Ando; **Physical Review B**, Volume 72, Issue 10, September 1, 2005, p. 104501.

“**Capacitance Thermometer For Use At Low Temperatures and High Magnetic Fields**”, T. P. Murphy, E. C. Palm, L. Peabody, S. W. Tozer; **Review of Scientific Instruments**, Volume 72, Issue 8, August 2001, pp. 3462-3466.

“**Absence of Low Temperature Anomaly On The Melting Curve of ^4He** ”, I. A. Todoshchenko, H. Alles, H. J. Junes, A. Ya. Parshin, V. Tsepelin; **JETP Letters**, Volume 85, Issue 9, July 2007, pp. 454-457.

“**On The Properties of Vacancies In Solid ^4He As Studied By Pressure Measurements**”, P. Remeijer, S. C. Steel, R. Jochemsen, G. Frossati, J. M. Goodkind; **Fizika Nizkikh Temperatur**, Volume 23, Nos. 5/6, 1997, pp. 586-597.

“**Intrinsic and Dislocation Induced Elastic Behavior of Solid Helium**”, James Day, Oleksandr Syshchenko, John Beamish; **Physical Review B**, Volume 79, Issue 21, June 23, 2009, p. 214524.

“**Improved Capacitive Melting Curve Measurements**”, Alexander Sebedash, Juha Tuoriniemi, Elias Pentti, Anssi Salmela; **Journal of Physics: Conference Series**, Volume 150, (25th International Conference On Low Temperature Physics (LT25) 6–13 August 6-13, 2008, Amsterdam, The Netherlands).

8. MAGNETOCAPACITANCE / MAGNETORESISTANCE

“**Magnetocapacitance and the Edge State of a Two-Dimensional Electron System in the Quantum Hall Regime**” S. Takaoka, K. Oto, H. Kurimoto, K. Murase, K. Gamo, S. Nishi; **Physical Review Letters**, Volume 72, Issue 19, May 9, 1994, pp. 3080–3083.

“Magnetocapacitance: A Probe of Spin-Dependent Potentials” K. T. McCarthy, A. F. Hebard, S. B. Arnason; **Physical Review Letters**, Volume 90, Issue 11, March 2003, pp. 117201-1--117201-4.

“Mechanism of Grain-Boundary Magnetoresistance in Fe₃O₄ Films”, M. Ziese, R. Hohne, H.C. Semmelhack, H. Recketin, N. H. Hong, P. Esquinazi; **The European Physical Journal B - Condensed Matter**, Volume 28, Number 4, August 2002, pp. 415-422.

“Magnetodielectric Consequences of Phase Separation In The Colossal Magnetoresistance Maganite Pr_{0.7}Ca_{0.3}MnO₃”, R. S. Freitas, J. F. Mitchell, P. Schiffer; **Physical Review B**, Volume 72, Issue 14, October 31, 2005, p. 144429.

“Electronic Instabilities in Shape-Memory Alloys”, J. C. Lashley, R. K. Schulze, B. Mihaila, W. L. Hults, J. L. Smith, P. S. Riseborough, C. P. Opeil, R. A. Fisher, O. Svitelskiy, A. Suslov, A. Planes, J. Mañosa, T. R. Finlayson; **Physical Review B**, Volume 75, Issue 20, May 15, 2007, p. 205119.

“Giant Electric Magnetocapacitance of Composite Silicate-Glasses as Sensitive Reactive Property for Particle Detectors at Low Temperatures”, Marco Barucci, Luca Foggetta, Andrea Giuliani, Giancarlo Jug, Claudia Nones, Emiliano Olivieri, Marisa Pedretti, Gianluigi Pessina, Lara Risegari, Samuele Sangiorgio, Guglielmo Ventura; **DERBY Collaboration (Como, Firenze, Milano – Italy)**.

“Infrared and THz Studies of Polar Phonons and Magnetodielectric Effect In Multiferroic BiFeO₃ Ceramics”, S. Kamba, D. Nuzhnyy, M. Savinov, J. Sebek, J. Petzelt, J. Prokleska, R. Haumont, J. Kreisel; **Physical Review B**, Volume 75, Issue 2, January 1, 2007, p. 024403.

“Colossal Magnetocapacitance and Scale-Invariant Dielectric Response In Phase-Separated Manganites”, Ryan P. Rairigh, Guneeta Singh-Bhalla, Sefaatin Tongay, Tara Dhakal, Amlan Biswas, Arthur F. Hebard; **Nature Physics**, Volume 3, Number 8, 2007, pp. 551-555.

“Enhancing The Magnetoelectric Coupling In YMnO₃ by Ga Doping”, A. A. Nugroho, N. Bellido, U. Adem, G. Nénert, Ch. Simon, M. O. Tjia, M. Mostovoy, T. T. M. Palstra; **Physical Review B**, Volume 75, Issue 17, 2007, pp. 174435-1--174435-5.

“Angle-Resolved Magnetization Study of the Multipole Ordering in PrFe₄P₁₂”, Hidekazu Sato, Toshiro Sakakibara, Takashi Tayama, Takahiro Onimaru, Hitoshi Sugawara, Hideyuki Sato; **Journal of the Physical Society of Japan**, Volume 76, Number 6, June 2007, p. 064701.

“Magnetodielectric Effect and Optic Soft Mode Behaviour In Quantum Paraelectric EuTiO₃ Ceramics”, S. Kamba, D. Nuzhnyy, P. Vanek, M. Savinov, K. Knizek, Z. Shen, E. Santava, K. Maca, M. Sadowski, J. Petzelt; **EPL**, Volume 80, Number 2, October 2007, Article 27002.

“Magnetic Phase Diagrams of Multiferroic Hexagonal RMnO₃ (R=Er, Yb, Tm, and Ho)”, F. Yen, C. dela Cruz, B. Lorenz, E. Galstyan, Y. Y. Sun, M. Gospodinov, C. W. Chu; **Journal of Materials Research**, Volume 22, Issue 8, August 2007, pp. 2163-2173.

“Magnetodielectric coupling by exchange striction in Y₂Cu₂O₅”, U. Adem, G. Nénert, A. Arramel, N. Mufti, G.R. Blake, T.T.M. Palstra; **The European Physical Journal B**, Volume 71, Number 3, October 2009, pp. 393–399.

“Observation of a Multiferroic Critical End Point”, Jae Wook Kim, S. Y. Haam, Y. S. Oh, S. Park, S.-W. Cheong, P. A. Sharma, M. Jaime, N. Harrison, Jung Hoon Han, Gun-Sang Jeon, P. Coleman, Kee Hoon Kim; **Proceedings of the National Academy of Sciences (PNAS)**, Volume 106, Issue 37, September 2009, pp. 15573-15576.

“Magnetoelectric Effect and Spontaneous Polarization in HoFe₃(BO₃)₄ and Ho_{0.5}Nd_{0.5}Fe₃(BO₃)₄” R. P. Chaudhury, F. Yen, B. Lorenz, Y. Y. Sun, L. N. Bezmaternykh, V. L. Temerov, C. W. Chu; **Physical Review B**, Volume 80, Issue 10, September 2009, p. 104424.

“Magnetic field induced ferroelectric to relaxor crossover in Tb_{1-x}Ca_xMnO₃”, N Mufti, G R Blake, A A Nugroho, T T M Palstra; **Journal of Physics: Condensed Matter**, Volume 21, Number 45, November 2009, p. 452203.

"**Magnetodielectric coupling in frustrated spin systems: the spinels $M\text{Cr}_2\text{O}_4$ ($M = \text{Mn, Co and Ni}$)**", N Mufti, A A Nugroho, G R Blake, T T M Palstra; **Journal of Physics: Condensed Matter**, Volume 22, Number 7, February 24, 2010.

9. MAGNETOMETRY

Related to magnetic fields is the "**Faraday Force Magnetometer for High-Sensitivity Magnetization Measurements at Very Low Temperatures and High Fields**", Toshiro Sakakibara, Hiroyuki Mitamura, Takashi Tayama and Hiroshi Amitsuka; **Japanese Journal of Applied Physics**, Volume 33 (September 1994) pp. 5067-5072. Magnetic moment was measured with a resolution of better than $1 \times 10^{-7} \text{A}\cdot\text{m}^2$ ($1 \times 10^{-4} \text{emu}$). An **AH2500A** bridge measured the capacitance change of a parallel-plate variable capacitor.

"**Structure of A Highly Sensitive Cantilever Magnetometer for Measurements of the Low Dimensional Electron System**", M. Schwarz, I. Meinel. D. Grundler, D. Heitmann; **German Physical Society (DPG)**, 1999.

"**Magnetodielectric Response of the Spin-Ice $\text{Dy}_2\text{Ti}_2\text{O}_7$** ", Masafumi Saito, Ryuji Higashinaka, Yoshiteru Maeno; **Physical Review B**, Volume 72, Issue 14, October 2005, p. 144422.

"**High-field Cantilever Magnetometry As A Tool For The Determination of The Magnetocrystalline Anisotropy of Single Crystals**", Fátima Martín-Hernández, Iris M. Boinaar-Silkens, Mark J. Dekkers, Jan Kees Maan; **Tectonophysics**, Volume 418, Issues 1-2, May 14, 2006, pp. 21-30.

"**Cantilever Torque Magnetometry On Molecular Magnets**", F. El Hallak, J. van Slageren, M. Dressel; **New Developments in Magnetic Resonance Techniques**, Heinrich-Fabri – Institut in Blaubeuren, Germany, September 6-7, 2006.

"**Magnetoelastic Coupling in TbFe_2 (110) Thin Films**", M. Ciria, J. I. Arnaudas, C. Dufour, V. Oderno, K. Dumesnil, A. del Moral; **Journal of Applied Physics**, Volume 81, Issue 8, April 15, 1997, pp. 5699-5701.

10. PRESSURE METROLOGY / CAPACITIVE BOLOMETRY

"**Type 2 Actuator Final Report**" For: NASA Langley Research Center, Hampton, Virginia, Alson E. Hatheway Inc., Contract Number NAS1-98035, August 30, 1999.

"**Insubria-Florence Development of a Low Temperature Capacitive Bolometer for the Detection of Rare Events**", M. Pedretti, A. Fascilla, A. Giuliani, G. Jug, G. Pessina, G. Ventura, E. Olivieri, E. Pasca, M. Barucci, L. Risegari; **Proc. of 8th International Conference Advanced Technology and Particle Physics**, October 2003.

"**Can a Pressure Standard be Based on Capacitance Measurements?**", Michael R. Moldover; **Journal of Research of the National Institute of Standards and Technology**, Volume 103, Number 2, March-April 1998, pp. 167-175.

"**Proposed Pressure Standard Based on Capacitance Measurements**", Michael R. Moldover; **American Physical Society Meeting**, Washington, DC, April 18, 1997.

"**Accurate Measurements of the Dielectric Constants with Toroidal Cross Capacitors**", M. R. Moldover, T. J. Buckley; **Chemical Science and Technology Laboratory Technical Activities Report - FY 2000**, Process Measurements Division.

"**Atomic Standard of Pressure**", M. R. Moldover, T. J. Buckley, A. M. Jeffery, K. Szalewicz; **Chemical Science and Technology Laboratory Technical Activities Report - FY 2000**, Process Measurements Division.

"**Super-Precision Capacitance Bridge**", Carl Andeen; **SBIR Program Solicitation**, FY 2003 Phase 1 Award Winner; FY 2004 Phase 2 Award Winner.

"**Next Generation Pressure Standard**", M. R. Moldover, T. J. Buckley, A. M. Jeffery, K. Scalewicz; **NIST**, 2002.

“My Projects On CRYO I: Optical System and Labview Programs”, David Kleinhans, University of Munster, Germany, June 16, 2003.

“Hydrogen in Porous Vycor Glass”, M. Schindler, A. Dertinger, Y. Kondo, F. Pobell; **Physical Review B**, Volume 53, Issue 17, May 1, 1996, pp. 11451-11461.

“Gap Dependence of The Tip-Sample Capacitance”, Shu Kurokawa, Akira Sakai; **Journal of Applied Physics**, Volume 83, Issue 12, 1998, pp. 7416-7423.

“Sample Cooling and Rotation at Ultra-Low Temperatures and High Magnetic Fields”, J. S. Xia, E. D. Adams, N. S. Sullivan, W. Pan, H. L. Stormer, D. C. Tsui; **International Journal of Modern Physics B**; Volume 16, Issue 20, August 2002, pp. 2986-2989.

“Gravitational capillary viscometer for low-temperature liquids”, David K. Hilton, Steven W. Van Sciver; **Review of Scientific Instruments**, Volume 78, Issue 3, March 2007, p. 033906.

“Ga substitution as an effective variation of Mn-Tb coupling in multiferroic TbMnO₃”, Oleksandr Prokhnenko, Nadir Aliouane, Ralf Feyerherm, Esther Dudzik, Anja U.B. Wolter, Andrey Maljuk, Klaus Kiefer, Dimitri N. Argyriou; **Physical Review B**, Volume 81, Issue 2, January 2010, p. 024419.

“An accurate differential pressure gauge for use in liquid and gaseous helium”, Chris J. Swanson, Kris Johnson, Russell J. Donnelly; **Cryogenics**, Volume 38, Number 6, June 1998, pp. 673-677.

11. SCANNING CAPACITANCE MICROSCOPY (SCM) / SPECTROSCOPY

“Quantitative Scanning Capacitance Spectroscopy”, W. Brezna, M. Schramboeck, A. Lugstein, S. Harasek, H. Enichlmair, E. Gertagnolli, E. Gornik, J. Smoliner; **Applied Physics Letters**, Volume 83, Issue 20, November 17, 2003, pp. 4253-4255.

“Quantitative Scanning Capacitance Spectroscopy on GaAs and InAs Quantum Dots”, W. Brezna, T. Roch, G. Strasser, J. Smoliner; **Proceedings of the GMe Forum 2005**, Vienna University of Technology, March 17-18, 2005.

“Electron-beam Deposited SiO₂ Investigated By Scanning Capacitance Microscopy”, W. Brezna, M. Fischer, H. D. Wanzenboeck, E. Bertagnolli, J. Somliner; **Applied Physics Letters**, Volume 88, Issue 12, March 20, 2006, p. 122116.

“An Intercepted Feedback Mode For Light Sensitive Spectroscopic Measurements In Atomic Force Microscopy”, J. Smoliner, W. Brezna; **Review of Scientific Instruments**, Volume 78, Issue 10, October 2007, p. 106104.

“Spatially Resolved Measurements of The Capacitance By Scanning Tunneling Microscope Combined With A Capacitance Bridge”, Hitoshi Arakawa, Ryusuke Nishitani; **Journal of Vacuum Science & Technology B: Microelectronics and Nanometer Structures**, Volume 19, Issue 4, July 2001, pp.1150-1153.

“Mapping of Local Oxide Properties By Quantitative Scanning Capacitance Spectroscopy”, W. Brezna, S. Harasek, A. Lugstein, T. Leitner, H. Hoffmann, E. Bertagnolli, J. Smoliner; **Journal of Applied Physics**, Volume 97, Issue 9, 2005, pp. 093701-093701-4.

“Room Temperature Capacitance Imaging of Single Sub-Surface InAs Quantum Dots”, J. Smoliner, W. Brezna, P. Klang, A. M. Andrews, G. Strasser; **Journal of Physics: Conference Series**, Volume 109, Issue 1, 2008, p. 012032.

“Tip Geometry Effects In Scanning Capacitance Microscopy On GaAs Schottky and Metal-Oxide-Semiconductor-Type Junctions”, C. Eckhardt, W. Brezna, O. Bethge, E. Bertagnolli, J. Smoliner; **Journal of Applied Physics**, Volume 105, Issue 11, 2009, p. 113709.

12. SINGLE ELECTRON TUNNELING (SET)

“A Capacitance Standard Based on Counting Electrons”, Mark W. Keller, Ali L. Eichenberger, John M. Martinis, Neil M. Zimmerman; Science Magazine, Volume 285, Number 5434, September 10, 1999, pp. 1706-1709.

“Standards of Current and Capacitance Based on Single-Electron Tunneling Devices”, Mark W. Keller, Proceedings of Fermi School CXLVI: “Recent Advances in Metrology and Fundamental Constants”, October 2000.

“Single Electronics for Standards and Metrology”, Electronics and Electrical Engineering Laboratory, NIST, January 2003.

“Novel Cryogenic Capacitor For Single-Electron Charging Experiments”, G. D. Willenberg, P. Warnecke; Conference on Precision Electromagnetic Measurements, Sydney, Australia, May 14-19, 2000, Conference Digest.

“Counting Electrons One By One - Overview of a Joint European Research Project”, Helko E. van den Brom, Oswin Kerkhof, Sergey V. Lotkhov, Sergey. A. Bogoslovsky, Gerd-Dietmar Willenberg, Hansjörg Scherer, Alexander B. Zorin, S. Pedersen, C. Kristoffersson, A. Aassime, Per Delsing, Marian A. Taslakov, Z. Ivanov, Håkan Nilsson, Stephen Giblin, Peter Kleinschmidt, Christian Hof, Ali L. Eichenberger, Frédéric Overney, Blaise Jeanneret, G. Genevès, Nicolas Feltn, Laurent Devoille, F. Gay, and François P. M. Piquemal; IEEE Transactions On Instrumentation and Measurement Volume 52, Issue 2, April 2003, pp. 584-589.

“Stable Cryogenic Vacuum Capacitor for Single-Electron Charging Experiments”, Gerd-Dietmar Willenberg, Peter Warnecke; IEEE Transactions On Instrumentation and Measurement, Volume 50, Issue 2, April 2001, pp. 235-237.

13. STRUCTURE AND PHASE TRANSITIONS

“Order Disorder Phase Transitions in Sodium Nitrate”, A. Nicole MacDonald, Submitted in Partial Fulfillment for BS with Honors at Saint Francis Xavier University, Antigonish, Nova Scotia, April 2003.

“High-Resolution Phase Velocity Measurements in an Acoustic Cavity”, Eduardo M. Calleja, Shanshan Qi, University of Florida, Physics Department, Summer 2003 Research Program, July 29, 2003.

“Mesoscopic Behaviour of The Neutral Fermi Gas ^3He Confined In Quantum Wires” S. L. Phillipson, A. M. Guénault, S. N. Fisher, G. R. Pickett, P. J. Y. Thibault; Letters to Nature, Volume 395, Number 6702, October 8, 1998, pp. 578-580.

The **AH2500A** was used to measure the performance of a capacitive sensor designed to probe the wetting by a liquid film in a pipe-flow experiment, **“Probing The Wetted Perimeter In A HEII Two-Phase Pipe-Flow Experiment Using A Capacitive Sensor”**, P. Thibault, E. di Muoio, L. Puech, B. Rousset, P. E. Wolf; CRTBT/CNRS, Grenoble, France.

The **AH2500A** bridge was used to directly measure the angular changes of a sample plate with a capacitive pressure sensor in **“Angular Dependent Measurements of The $\nu = 5/2$ Fractional Quantum Hall Effect State At Ultra-Low Temperatures”**, J. S. Xia, W. Pan, E. D. Adams, N. S. Sullivan, H. L. Stormer, D. C. Tsui, L. N. Pfeiffer, K. W. Baldwin, and K. W. West, preprint submitted to LT23 Proceedings, November 9, 2002. Also used in this experiment was a calibrated ^3He melting pressure thermometer (MPT) where the change of the temperature was found to be less than 50 μK .

A capacitive pressure gauge was also used for temperature control of the experimental cell in the **“Observation of a New Excitation in bcc ^4He by Inelastic Neutron Scattering”**, by Emil Polturak, Tuvy Markovich, Jacques Bossy, Emmanuel Farhi, LT23 Proceedings, September 25, 2002, p. 2.

“Critical Adsorption in a Well-Defined Geometry”, R. Garcia, S. Scheidemantel, K. Knorr, M. H. W. Chan; Physical Review E, Volume 68, Issue 5, November 20, 2003, pp. 056111-1 to 056111-9.

“Non-Fermi Liquid Behaviour in Uranium-Based Heavy-Fermion Compounds”, Pedro Miguel de Lemos Correia Estrella; Thesis at Universiteit van Amsterdam, 2000.

“Freezing and Pressure-Driven Flow of Solid Helium In Vycor”, James Day, Tobias Herman, John Beamish; **Physical Review Letters**, Volume 95, Issue 3, July 2005, p. 035301.

“Helium Adsorption in Silica Aerogel near the Liquid-Vapor Critical Point”, James Day, Tobias Herman, John Beamish; **Physical Review B**, Volume 72, Issue 18, November 2005, p. 184202.

“Raman Scattering from phonons and magnons in $RFe_3(BO_3)_4$ ”, Daniele Fausti, Agung Nugroho, Paul H.M. van Loosdrecht, Sergi A. Klimin, Marina N. Popova, Leonard N. Bezmaternykh; **Physical Review B**, Volume 74, Issue 2, July 2006, p. 024403.

“Measurements On The Melting Curve of 4He Down to 10 mK”, I. A. Todoshchenko, H. Alles, H. J. Junes, A. Ya. Parshin, V. Tselpin; [arXiv:cond-mat/0607081](https://arxiv.org/abs/cond-mat/0607081), V1, July 4, 2006.

“Reentrant Radio-Frequency Resonator For Automated Phase-Equilibria and Dielectric Measurements In Fluids”, Anthony R. H. Goodwin, James B. Mehl, Michael R. Moldover; **Review of Scientific Instruments**, Volume 67, Issue 12, December 1996, pp. 4294-4303.

“On the Magnetic Structure of Quasi One Dimensional Spin 1/2 System of Li_2ZrCuO_4 ”, Yasuko Tarui, Yoshiaki Kobayashi, Masatoshi Sato; **Journal of the Physical Society of Japan**, Volume 77, Number 4, April 2008, p. 043703.

14. SUPERCONDUCTIVITY

An interesting use of the capacitance bridge was noted in **“Superconductivity In Heavy-Fermion $U(Pt, Pd)_3$ and Its Interplay With Magnetism”** R. J. Keizer, A. de Visser, M. J. Graff, A. A. Menovsky and J. J. M. Franse, **Physical Review B**, Volume 60, Issue 14, October 1, 1999, pp. 10527-10538. In the dilatometry portion of the experiment, the sample of $U(Pt, Pd)_3$ used for the thermal expansion and magnetostriction experiments was cut from a single-crystalline batch and length changes were determined with the **AH2500A Option E** bridge. The sensitivity noted was 0.01 angstrom. The linear magnetostriction was measured by sweeping the magnetic field while monitoring the length of the sample.

“The Fermi Surface of $CeCoIn_5$: dHvA”, Donavan Hall, E. Palm, T. Murphy, S. Tozer, Z. Fisk, U. Alver, R. G. Goodrich, J. L. Sarrao, P. G. Pagliuso, Takao Ebihira; **Physical Review B**, Volume 64, Issue 21, December 1, 2001, p. 212508.

“Magnetic Enhancement of Superconductivity from Electron Spin Domains”, H. A. Radovan, N. A. Fortune, T. P. Murphy, S. T. Hannahs, E. C. Palm, S. W. Tozer, D. Hall; **Letters to Nature**, Volume 425, September 2003, pp. 51-55.

“Unconventional Superconductivity in $CeCoIn_5$ with Magnetic Texture and Orbital Quantization”, H. A. Radovan, N. A. Fortune, T. P. Murphy, S. T. Hannahs, E. C. Palm, S. W. Tozer, D. Hall; arxiv.org/pdf/cond-mat/0304526, V1, April 23, 2003.

“Quantum Liquid of Vortices in the Quasi-two-dimensional Organic Superconductor $Kappa - (BEDT-TTF)_2 Cu(NCS)_2$ ”, T. Sasaki, W. Biberacher, K. Neumaier, W. Hehn, K. Andres, T. Fukase; **Physical Review B**, Volume 57, Issue 17, May 1, 1998, pp. 10889-10892.

“Spin-Peierls Transition in NaV_2O_5 in High Magnetic Fields”, S. G. Bompadre, Arthur F. Hebard, Valeri N. Kotov, Donavan Hall, G. Maris, J. Baas, T. T. M. Palstra; **Physical Review B**, Volume 61, Issue 20, May 2000, pp. R13321-R13324.

15. SUPERFLUIDS

“Doubly Quantized Vorticity and other NMR Experiments on Rotating 3He Superfluids”, Jaakko Ruohio, Dissertation for the degree of Doctor of Science in Technology at the Department of Engineering Physics and Mathematics at Helsinki University of Technology (Espoo, Finland) April 6, 2001.

“Avalanches in the Draining of Nanoporous Nuclepore Mediated by the Superfluid Helium Film”, M. P. Lilly, A. H. Wootters, R. B. Hallock; **Physical Review B**, Volume 65, Issue 10, February 11, 2002, p. 104503.

“Pressure-driven flow of solid helium”, James Day, John Beamish; **Physical Review Letters**, Volume 96, Issue 10, March 2006, p. 105304.

“Probing The Internal Structure of Nuclepore With Hysteretic Capillary Condensation”, M. P. Lilly, R. B. Hallock; **Physical Review B**, Volume 63, Issue 17, May 1, 2001, p. 174503.

“Avalanche Behavior In The Draining of Superfluid Helium From The Porous Material Nuclepore”, M. P. Lilly, R. B. Hallock; **Physical Review B**, Volume 64, Issue 2, July 1, 2001, p. 024516.

16. TUNNELING

“Magnetic Field Dependent Tunneling in Glasses”, P. Strehlow, M. Wohlfahrt, A.G.M. Janssen, R. Hauelsen, G. Weiss, C. Enss, S. Hunklinger; **Physical Review Letters**, Volume 84, Issue 9, February 28, 2000, pp. 1938-1941.

17. ATOMIC LAYER DEPOSITION (ALD)

“A Study of The Effects of ALD Growth Temperature On Al₂O₃ Gate Oxide By C-V and G-V Measurements”, Miles E. Lopes, UCLA Department of Physics & Astronomy.

18. NANO-FORCE METROLOGY

“Traceable Micro-Force Sensor for Instrumented Indentation Calibration”, Douglas T. Smith, Gordon A. Shaw, Richard M. Seugling, Dan Xiang, Jon R. Pratt; **MRS Spring Meeting 2007**, San Francisco, California, April 2007.

“Simultaneous Scanning Tunneling Microscopy and Stress Measurements To Elucidate The Origins of Surface Forces”, Tetsuya Narushima, Niall T. Kinahan, John J. Boland; **Review of Scientific Instruments**, Volume 78, Number 5, May 2007, p. 053903.

“Traceable Force Metrology For Micronewton Level Calibration”, Richard M. Seugling, Jon R. Pratt; **National Institute of Standards and Technology**, Gaithersburg, Maryland 20899.

“SI Traceable Calibration of An Instrumented Indentation Sensor Spring Constant Using Electrostatic Force”, Koo-Hyun Chung, Stefan Scholz, Gordon A. Shaw, John A. Kramar, Jon R. Pratt; **Review of Scientific Instruments**, Volume 79, Issue 9, September 2008, p. 095105.

“Direct Electrostatic Calibration of Hybrid Sensors for Small Force Measurement”, Koo-Hyun Chung, Gordon A. Shaw, Jon R. Pratt; **Proceedings of the Society of Experimental Mechanics Annual Conference**, Springfield, Massachusetts, June 4, 2007.

“Accurate noncontact calibration of colloidal probe sensitivities in atomic force microscopy”, Koo-Hyun Chung, Gordon A. Shaw, Jon R. Pratt; **Review of Scientific Instruments**, Volume 80, Issue 6, June 2009, p. 065107.

19. PRECISION POSITIONING

“Test Results for Nanometer-Class Cryogenic Structural Actuators for NGST”, A. E. Hatheway; Next Generation Space Telescope Science and Technology, **ASP Conference Series**, Volume 207, Proceedings of a conference held at Hyannis, Massachusetts, September 13-16, 1999.

20. SCANNING TUNNELING MICROSCOPY (STM)

“Tip-Sample Capacitance in STM”, Shu Kurokawa, Akira Sakai; **Science Reports of the Research Institutes, Tohoku University**, A44, Number 2, March 1997, pp. 173-179.

21. GLASSES

“Evidence for a Second Order Phase Transition in Glasses at Very Low Temperatures - A Macroscopic Quantum State of Tunneling Systems”, P. Strehlow, C. Enss, S. Hunklinger; **Physical Review Letters**, Volume 80, Issue 24, June 1998, pp. 5361-5364.

“Electrical Properties of Lithium Niobosilicate Gel Derived Glass and Glass-Ceramics”, M. P. F. Graca, M. G. Ferreira da Silva, M. A. Valente; **Key Engineering Materials**, Volumes 230-232, 2002, pp. 161-164.

“Study of Dielectric Response of Quadrupolar Glasses using High Sensitivity AC Capacitance Bridge”, S. Pilla, Jaha A. Hamida, N. S. Sullivan; **Abstract submitted for the SES97 Meeting of The American Physical Society**, Nashville, Tennessee, November 7, 1997.

“Influence of Geometry on Quadrupolar Order-Disorder Transition in Solid N₂: Dielectric Response”, S. Pilla, Jaha A. Hamida, K. A. Muttalib, N. S. Sullivan; **Abstract submitted for the SES97 Meeting of The American Physical Society**, Nashville, Tennessee, November 7, 1997.

“Nearly Constant Behavior in Molecular Glass-Formers”, Katalin Gainaru, Alberto Rivera, Thomas Blochowicz, Christian Tschirwitz, Ernst A. Rössler; **German Physical Society** e. V. (DPG), Spring Meeting.

“Low Temperature ac Dielectric Response of Glasses to High dc Electric Fields”, D. J. Salvino, S. Rogge, B. Tigner, D. D. Osheroff; **Physical Review Letters**, Volume 73, Issue 2, July 11, 1994, pp. 268-271.

Here are two representative articles using the **AH2500A** to accurately measure capacitance as part of research into glasses: **“Dielectric Constant of Glasses: First Observation of A Two-Dimensional Behavior”**, F. Ladieu, J. Le Coche (DSM/DRECAM/LPS, C.E. Saclay, France), P. Pari (SPEC, C.E. Saclay, France), P. Trouslard and P. Ailloud (INSTN/LVDG, C.E. Saclay, France); **arXiv:cond-mat/0210024**, V1, October 1, 2002, and

“Magnetic Field Effect On The Dielectric Constant of Glasses: An Evidence of Disorder Within Tunneling Barriers?”, J. Le Coche, F. Ladieu (DSM/DRECAM/LPS, C.E. Saclay, France), P. Pari (DSM/DRECAM/SPEC, C. E. Saclay, France); **Physical Review B**, Volume 66, Issue 6, August 2002, p. 064203.

“Evidence For Growth of Collective Excitations In Glasses At Low Temperature”, Douglass Natelson, Danna Rosenberg, D. D. Osheroff; **Physical Review Letters**, Volume 80, Issue 21, May 25, 1998, pp. 4689-4692.

“Thickness Dependence of The Dynamics In Thin Films of Isotactic Poly (methylmethacrylate)”, J. S. Sharp, J. A. Forrest; **The European Physical Journal E**, Volume 12, Supplement 1, September 2003.

“Low Temperature Properties In Molecular Glass Formers”, C. Gainaru, A. Rivera, T. Blochowicz, E. Rössler; **International Workshop on Dynamics in Viscous Liquids**, Munich, March 2004, Poster B31.

“Evidence of Secondary Relaxations In The Dielectric Spectra of Ionic Liquids”, Alberto Rivera, Ernst A. Rössler; **Physical Review B**, Volume 73, Issue 21, June 2006, p. 212201.

“Dynamics of Glass-Forming Liquids. XI. Fluctuating Environments By Dielectric Spectroscopy”, Wei Huang, Ranko Richert; **The Journal of Chemical Physics**, Volume 124, Number 16, April 28, 2006, p. 164510.

“Dynamics of Glassy and Liquid M-Toluidine Investigated By High-Resolution Dielectric Spectroscopy”, Andrea Mandanici, Maria Cutroni, Ranko Richert; **The Journal of Chemical Physics**, Volume 122, February 2005, p. 084508.

“Orientational and Translational Dynamics In Room Temperature Ionic Liquids”, A. Rivera, A. Brodin, A. Pugachev, E. A. Rössler; **The Journal of Chemical Physics**, Volume 126, Issue 11, March 2007, pp. 114503-114503-7.

“Anomalous Properties of The Local Dynamics In Polymer Glasses”, R. Casalini, C. M. Roland; **The Journal of Chemical Physics**, Volume 131, Issue 11, September 2009, p. 114501.

“Diluent Effects on the Debye-Type Dielectric Relaxation in Viscous Monohydroxy Alcohols”, Li-Min Wang, Shervin Shahriari, Ranko Richert; **Journal of Physical Chemistry B**, Volume 109, Issue 49, December 15, 2005,

pp. 23255–23262.

“**Properties of porous glasses with embedded ferroelectric materials**”, E. Rysiakiewicz-Pasek, R. Poprawski, J. Polanska, A. Urbanowicz, A. Sieradzki; **Journal of Non-Crystalline Solids**, Volume 352, Issues 40-41, November 1, 2006, pp. 4309-4314

22. GRAVITY

“**Engineering**” Microgravity Scaling Theory Experiment (MISTE), **NASA Jet Propulsion Laboratory**, California Institute of Technology.

23. SEMICONDUCTOR TEST

“**Frequency-Dependent Complex Conductivity of An Organic Thin-Film Transistor**”, Daniel R. Lenski, Adrian Southard, Michael S. Fuhrer; **Applied Physics Letters**, Volume 94, June 2009, pp. 232103.

“**Test Chip to Evaluate Measurement Methods for Small Capacitances**”, Joseph J. Kopanski, M. Yaqub Afridi, Chong Jiang, Curt A. Richter; **2009 IEEE International Conference on Microelectronic Test Structures**, ICMTS 2009, March 30, 2009-April 2, 2009, Oxnard, California, pp. 39-42.

24. ELECTRICAL / CAPACITANCE METROLOGY

Due to the very large number of papers published, a separate list has been created for this topic. Please contact Andeen-Hageling for the list.

25. MISCELLEANOUS

“**Silica Monoliths Templated on L₃ Liquid Crystal**”, Abds-Sami Malik, Daniel M. Dabbs, Howard E. Katz, Ilhan A. Aksay; **Langmuir**, Volume 22, Issue 1, January 3, 2006, pp. 325-331.

“**Nanoscale Polymer Electrolytes: Ultrathin Electrodeposited Poly(Penylene Oxide) with Solid-State Ionic Conductivity**”, Christopher P. Rhodes, Jeffrey W. Long, Michael S. Doescher, John J. Fontanella, Debra R. Rolison; **Journal of Physical Chemistry B**, Volume 108, Issue 35, September 2, 2004, pp. 13079-13087.

“**On The Design of Capacitive Sensors Using Flexible Electrodes For Multipurpose Measurements**”, Pierre Thibault, Pantxo Diribarne, Thierry Fournier, Sylvain Perraud, Laurent Puech, P.-Etienne Wolf, Bernard Rousset, Roser Vallcorba; **Review of Scientific Instruments**, Volume 78, Number 4, April 2007, p. 043903.

“**Three-Terminal Capacitance Cell For Stopped-Flow Measurements of Very Dilute Solutions**”, Martin Tjahjono, Thomas Davis, Marc Garland; **Review of Scientific Instruments**, Volume 78, Number 2, February 2007, p. 023902.

“**Using a Precision Bridge for Magnitude and Phase Measurement of a Multiplying DAC with an AC Reference**”, Akira Maezawa, Bo Gong, Bryan Waltrip, Gerald FitzPatrick, Yicheng Wang; **IEEE Instrumentation and Measurement Technology Conference Proceedings**, IMTC 2008, May 12-15, 2008, pp. 777-780.

“**Dipolar Molecular Rotors In The Metal–Organic Framework Crystal IRMOF-2**”, Erick B. Winston, Peter J. Lowell, Jaroslav Vacek, Jana Chocholousová, Josef Michl, John C. Price; **Physical Chemistry Chemical Physics**, Volume 10, Issue 24, 2008, pp. 5188-5191.

“**Coordinative Properties of Highly Fluorinated Solvents with Amino and Ether Groups**”, Paul G. Boswell, Elizabeth C. Lugert, József Rábai, Elizabeth A. Amin, Philippe Bühlmann; **Journal of the American Chemical Society**, Volume 127, December 7, 2005, pp. 16976-16984.

“**Dipolar rotor-rotor interactions in a difluorobenzene molecular rotor crystal**”, Robert D. Horansky, Laura I. Clarke, Erick B. Winston, John C. Price, Steven D. Karlen, Peter D. Jarowski, Rosa Santillan, Miguel A. Garcia-Garibay; **Physical Review B**, Volume 74, Issue 5, 2006, p. 054306.

“Dielectric water sorption analysis”, M. Giacomelli Penon, S. J. Picken, M. Wübbenhorst, G. de Vos, J. van Turnhout; **Review of Scientific Instruments**, Volume 77, Issue 11, 2006, p. 115107.

NOTE TO OUR READERS: If you have published an article that is not mentioned in this document referencing the use of one of our instruments, please let us know about it. Capacitance is a powerful tool for many situations. However, it takes continuous proof by example to show its value among so many other competing technologies.