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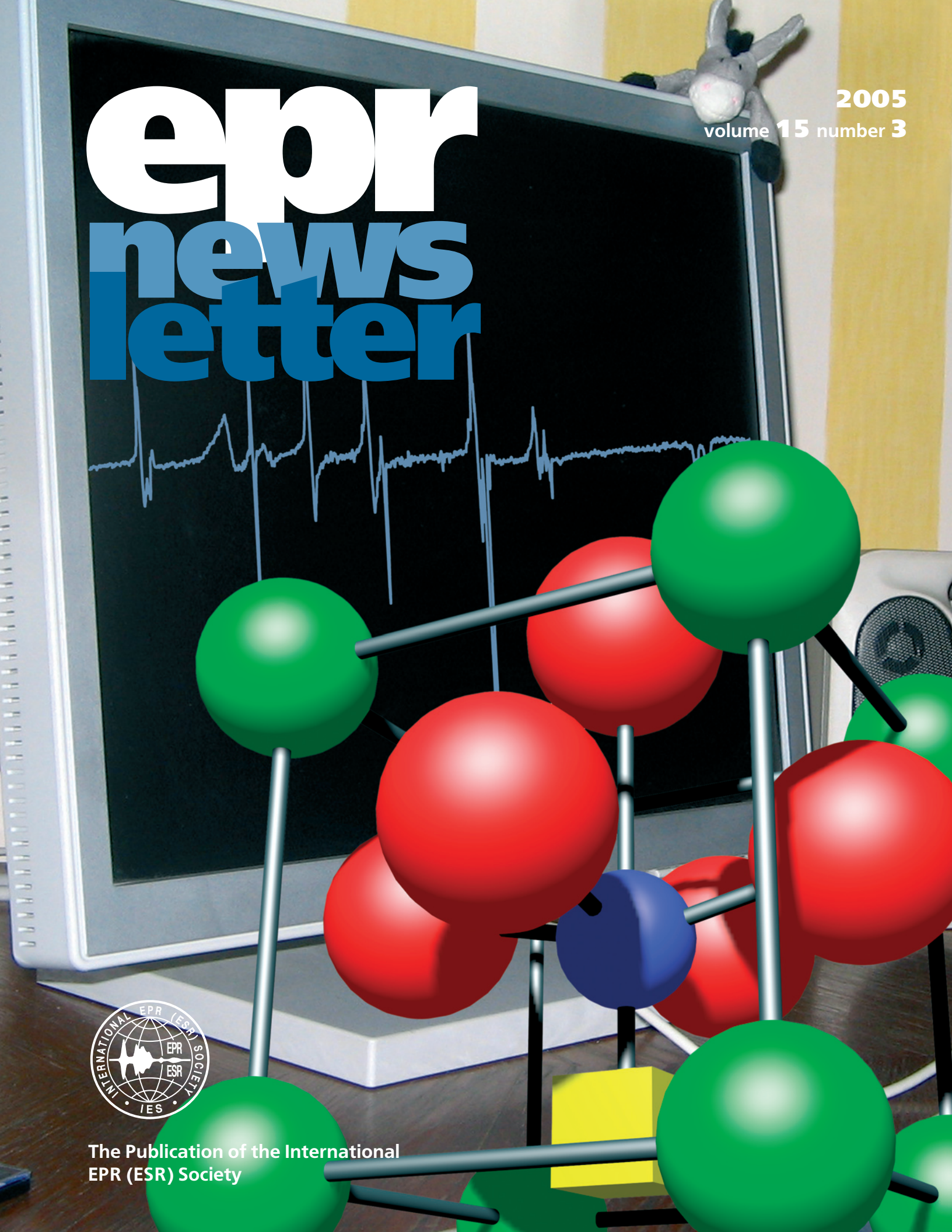
2005
volume 15 number 3



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Please feel free to contact us with items (news, notices, technical notes, and comments) or ideas for the *EPR newsletter*.

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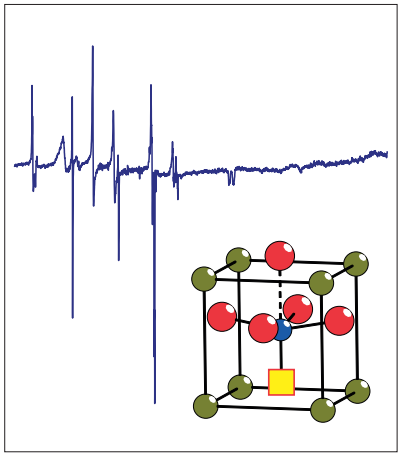

The cover picture illustrates aspects of the research carried out by Klaus-Peter Dinse, recipient of the Bruker Prize 2005. It shows the local structure of the Fe^{3+} functional centers (blue) substituting for Ti^{4+} in ferroelectric lead titanate ($PbTiO_3$) as deduced from an analysis of its 94 GHz EPR spectrum. The amazingly well-resolved Fe^{3+} powder spectrum can fully be analyzed, yielding sign, size and symmetry of the fine structure (FS) interaction of the $S = 5/2$ spin probe. Although still in the intermediate field regime at 94 GHz, the FS parameter can be determined with high accuracy. Using results from DFT and semi-empirical calculations, the presence of a unique oxygen vacancy (yellow cube) in the first coordination shell is confirmed, which is forming an iron-oxygen vacancy defect dipole. The observation of an FS tensor of axial symmetry can further be used to locate the position of the oxygen vacancy along the crystallographic *c*-axis. This investigation was performed together with Dr. R.-A. Eichel in his group and is supported by the DFG center of excellence "Electric fatigue of functional materials" (H. Meštrić et al., Phys. Rev. B 71 (2005) 134109).

epr newsletter

The Publication of the International EPR (ESR) Society

volume 15 number 3 2005

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Are you interested to become a member of the International EPR (ESR) Society? Please find the registration/ information form for new/continuing members of the IES and non-credit-card payment instructions for individual members on this Web site:
www.epr-newsletter.ethz.ch/contact.html

photo of the issue

see page 17

TAKE OUR QUIZ!

What does this picture show? Is it a painting hanging in a museum of modern art? Is it a stained glass window by Marc Chagall, or a tapestry in the office of the CEO of the International EPR Society? Or is it a microphoto of an EPR spectrometer on a chip? We give you a hint: What you see here is mentioned several times in this issue of the *EPR newsletter*, so, just read all contributions carefully and you get it! Send an e-mail message to the editor with your answer. Deadline March 15, 2005. If we will get more than one correct answer, a raffle will be held to decide who is the prize winner. The prize is a lovely sample of a mineral from the Rocky Mountains (another hint!).

Editorial

Dear colleagues,

It was nice to meet many of you at the Denver conference this August: old friends and acquaintances, and people known only by scientific publications and e-mail correspondence. To have a more or less extended e-mail correspondence with somebody for a long time and never exchanging a handshake and sharing a smile makes the connection somewhat virtual. Personal contact makes all the difference. I had numerous discussions with people, which resulted in a rich harvest of ideas for various columns in the *EPR newsletter*. I am most appreciative of Bruker BioSpin for covering my travel expenses to Denver and of the warm hospitality of Sandy and Gareth Eaton who hosted me at their home. Welcome to Gareth's article *New Ideas in Old Books* in the 'Another Passion' column. We might not have had the opportunity to read this article if I had not noticed Gareth's collection of old books in their living room. Yes Gareth, you are right. May be we cannot call your fascination with old science books a 'passion' (in fact, real passions are so rare nowadays), but for sure it fits this column letting the EPR community know another aspect of the personality of an outstanding EPR researcher and experience the same emotions as I did when Gareth told me about his interest in the development of ideas in science and I reverently held in my hands the oldest book from his collection.

Denver runs all through this issue of the *EPR newsletter*: please find also the minutes of the Annual Meeting of the IES hosted by the Denver conference. It was an epoch-making meeting: we say thank you and good-bye to the 'old' CEOs of the IES: Yuri Tsvetkov, Ron Mason, Takeji Takui, and Marina Brustolon, and we welcome the new CEOs: Wolfgang Lubitz, Balaraman Kalyanaraman, Shozo Tero-Kubota, and Carlo Corvaja. We are happy that Shirley Fairhurst and Chris Felix continue serving as CEOs.

Bad news: John Pilbrow stops being the Immediate Past President but also good news: he continues editing the '*EPR newsletter* Anecdotes' column. In this issue you will certainly enjoy the typical British humor of Michael Baker telling us about his early days in Oxford. Along with Denver, Hal Swartz, the father-founder of the IES, is also a superstar of this issue: we congratulate him to his 70th anniversary, we read about his IES Fellowship ceremony in the Ohio conference report and we look forward, with great anticipation, to the report about his 2005 Zavoisky Award ceremony to be published in the forthcoming issue. It was amazing: I first met Hal and Ann, his wife, in Denver, then in Novosibirsk at the SPIN'05 conference, and finally in Kazan at his Zavosiky Award celebration. I feel like I was fortunate to meet Hal and Ann, outstanding scientists and very sweet people.

However, life is not only meeting people. It is also parting with them. Recently, Clyde A. Hutchison Jr., one of the patriarchs of EPR, left us. I am sure that even those who did not know Clyde in person, could have had an insight to his personality after reading the article about him by Arthur Heiss, Ralph Weber and John Weil (13/3, p. 16). Reside in peace, our dear elder colleague and teacher! We will continue to remember you.

Laila Mosina

IES Annual Meeting 2005

Held at the 28th EPR Symposium at the Hyatt Regency, Denver USA on August 2nd 2005. The meeting was chaired by Ron Mason, Vice-President Americas and opened at 17:00.

1 Attendance (19)
Members: R. Mason, C. Felix, L. Mosina, K. Madden, R. Morse, S. S. Eaton, G. R. Eaton, J. Anderson, A. Kawamon, W. Trommer, H. Swartz, A. Smirnov, P. Fajer, W. Froncisz, A. Haddy, E. Hustedt and J. Jutson.
Non-members: M. Kemple and O. Li.

Apologies were received from Yu. Tsvetkov, S. Fairhurst, M. Brustolon, T. Takui, J. Pilbrow, W. Lubitz, B. Kalyanaraman, S. Tero-Kubota and C. Corvaja.

2 The Report of General Meeting held on 3rd August 2004 was accepted without comment

3 There were no matters arising from the 2004 General Meeting Report

4 Secretary's Report (Shirley Fairhurst's report was presented by Ron Mason)

IES Executive 2005–2008
Nominations for the next Executive were received from the President on behalf of the current Executive. As no other nominations were received the following are elected unopposed and will take up office on 1st October 2005.

President: Professor Dr. Wolfgang Lubitz, Max Planck Institute for Bioinorganic Chemistry, Mülheim, Germany
Vice-President Asia Pacific: Professor Shozo Tero-Kubota, Tohoku University, Japan
Vice-President Americas: Dr. Balaraman Kalyanaraman, Medical College of Wisconsin, USA
Vice-President Europe: Professor Carlo Corvaja, University of Padova, Italy
Treasurer: Dr. Chris Felix, Medical College of Wisconsin, USA
Secretary: Dr. Shirley Fairhurst, John Innes Centre, Norwich, UK
Immediate Past President: Professor Yuri Tsvetkov, Institute of Chemical Kinetics and Combustion, Novosibirsk, Russia

IES Awards 2005
Gold Medal: Professor Dr. Wolfgang Lubitz, Max Planck Institute for Bioinorganic Chemistry, Mülheim, Germany
Silver Medal for Instrumentation: Mr. Jos Disselhorst, Huygens Laboratory, Leiden University, The Netherlands
Young Investigator Award: Dr. Eric McInnes, Department of Chemistry, Manchester University, UK

Fellow of the Society 2005
Professor Harold M. Swartz, Dartmouth Medical School, Hanover, USA
Professor Keith A. McLauchlan, Oxford University, Oxford, UK
Professor Harvey A. Buckmaster, University of Victoria, Canada
Professor George D. Watkins, Lehigh University, Bethlehem, Pennsylvania, USA

IES Awards 2006: Call for Nominations
Nominations are invited for the following awards: Silver Medal (Chemistry), Silver Medal (Biology/Medicine) and Fellow of the Society (visit ieprs.org for full constitution and by-laws). All nominations must be accompanied by a 100–150 word citation in support of the nomination. No nomination can be considered without a citation. Additional supporting material may be included. Closing date: 15th November 2005.

5 President's Report (Yuri Tsvetkov's report was presented by Ron Mason)
Dear Colleagues,

On behalf of the IES Executive Committee, I wish to welcome all participants to the 2005 General Meeting of the IES and the 28th International EPR Symposium in Denver. I would like to express my gratitude to Professors Sandra and Gareth Eaton for ▶

New IES Executives

WOLFGANG LUBITZ, IES PRESIDENT
www.mpi-muelheim.mpg.de/mpistr_lubitz.html

Wolfgang Lubitz, born 1949 in Berlin, studied chemistry at the Freie Universität (FU) Berlin (1969–1974) where he also received his doctoral degree (1977) and habilitation (1982) in organic chemistry. From 1983 to 1984 he worked as a Max Kade Fellow at the University of California (San Diego, Department of Physics), from 1979 to 1989 as assistant and later associate professor at the FU Berlin, from 1989 to 1991 as professor at the Universität Stuttgart (experimental physics/biophysics), and from 1991 to 2001 as full professor of physical chemistry at the Max Volmer Institute, Technische Universität Berlin. In 2000 he became a Scientific Member of the Max Planck Society and director at the Max Planck Institute for Radiation Chemistry in Mülheim/Ruhr (later renamed Max Planck Institute for Bioinorganic Chemistry). Wolfgang Lubitz is honorary professor at the Heinrich-Heine-Universität Düsseldorf and currently managing director of the Max Planck Institute in Mülheim.

The research in his laboratory is largely dedicated to the development and application of advanced EPR methods in different frequency bands. In the past Wolfgang Lubitz' group has substantially contributed to light-induced charge separation in bacterial and plant photosynthesis by studying the radicals, radical pairs and triplet states that are created in this process. In recent years the focus has shifted to the investigation of catalytic metal centers in metalloproteins, for example in hydrogenases and the water splitting complex in photosystem II. The group's EPR work is supplemented by results from other spectroscopic techniques and by quantum chemical calculations.

Wolfgang Lubitz is (co)author of more than 200 publications in scientific journals, has contributed to books and written about 15 ▶

again allowing our General Meeting to take place during this Symposium. I regret that I will not be able to join you this year but I am sure that you will all have a successful meeting.

During this IES General Meeting we will present the results of our activities during the past year. It is a great pleasure to congratulate this year's IES Medal recipients and Fellows. The 2005 Gold Medal is awarded to Professor Wolfgang Lubitz (MPI Mülheim). I hope to present this award in person in Budapest in October. The 2005 Silver Medal for Instrumentation is awarded to Mr. Jos Disselhorst (Leiden) and the 2005 Young Investigator Medal goes to Dr. Eric McInnes (Manchester). Fellowships go to Professor Hal Swartz, Professor Keith McLauchlan, Professor George Watkins and Professor Harvey Buckmaster. I am sure that you will all join me in congratulating all the awardees.

During the last year I have represented the Society at various scientific meetings including the APES Conference in Bangalore, the Zavoisky Conference in Kazan and the ESR Group of the Royal Society of Chemistry Conference in Bath. During these meetings I presented IES awards, delivered speeches of congratulation and met with leaders of EFEPR and APES groups of EPR scientists. The nominations for the new IES executive resulted from discussions with these groups. An important aspect of my work over the last year has been involvement in the organization and reorganization of the Russian and India ESR Societies.

I am delighted to mention the ongoing success of our *newsletter*. I am sure that you, like me, look forward with anticipation for the next issue. Laila should be with you in Denver this year for the first time. I want to take this opportunity to thank Laila and her team of Associate Editors: Graham Timmins (Americas), Thomas Prisner (Europe) and Takeji Takui (Asia-Pacific); and our Technical Editor Sergei Akhmin for their work.

Please remember to contact them if you have any news or views you want to share with your colleagues via the *newsletter*. I would also like to express special thanks on behalf of the Society to Bruker for their help in posting the *newsletter* to all paid up members and for financing its color hard cover.

Thanks too must go to Professor Arthur Schweiger and his group at the ETH in Zurich for both maintaining and hosting the *EPR newsletter* website: www.epr-newsletter.ethz.ch. As well as electronic copies of the *newsletter*, you will find information about the Society, details of upcoming conferences and links to many EPR groups and details of our sponsors plus much more.

This is my final year as President and I would like to take this opportunity to thank the Executive Committee of the IES: our Vice-Presidents Ron Mason (Americas), Marina Brustolon (Europe) and Takeji Takui (Asia-Pacific); our Immediate Past President John Pilbrow; Secretary Shirley Fairhurst and Treasurer Chris Felix for all their efforts on our behalf. All developments and achievements are as a result of support from the Executive Committee, *newsletter* Editor and the Society members. Let me express my deep gratitude to you all.

I congratulate the new Executive on their election to office and ask for your active support for Wolfgang Lubitz, our next President and the new IES Executive when they take over on October 1st. Finally, I hope that all the participants of this 28th EPR Symposium in Denver find it to be both stimulating and rewarding and wish you all success.

Prof. Yuri Tsvetkov, IES President

6 Treasurer's Report (Chris Felix)

Chris presented the following report on the society's finances (see Table).

Year 2004. Full Year Accounts ($) (unaudited)

Balance January 1, 2004		11762.54
Income		9157.06
Expenses:		(13846.22)
Bank & credit card fees	605.42	
Web design & fees	2558.80	
Newsletter	10674.00	
Travel support	0.00	
State of Illinois	8.00	
Balance December, 31 2004		7073.38

Society (official) Website

Our official Society website: ieprs.org is a secure professional website providing:

- instant online payment,
- online membership records (unique username/password for all members),
- link to *EPR newsletter* website for *newsletter* online,
- for officers: direct database access for queries.

New IES Executives

review articles, and is on the editorial board of five journals. He is member of the IES, ISMAR and AMPERE Society and several other professional organizations such as the GDCh and ACS; he is also Fellow of the Royal Society of Chemistry (UK). Last year he became a permanent member of the Board of Curators for the Meetings of the Nobel Laureates in Lindau. Among other awards and fellowships he recently received the Zavoisky Award (2002), the Bruker Prize (2003) and the Gold Medal of the International EPR Society (2005).

BALARAMAN KALYANARAMAN, IES VICE-PRESIDENT AMERICAS

Balaraman Kalyanaraman received his BS in Chemistry from the University of Madras, Madras, India, and his MS from the Indian Institute of Technology, Bombay, India. In 1978, he received his PhD in Chemistry from the University of Alabama, Tuscaloosa, AL, USA, and postdoctoral training at the National Institute of Environmental Sciences in Research Triangle Park, NC, USA. In 1981, he joined the Biophysics Section of the Department of Radiology at the Medical College of Wisconsin, Milwaukee, USA. In 1984, he became an Assistant Professor in the Department of Radiology. Currently, he is Professor and Chairman of the Department of Biophysics at MCW. His research interests are centered on application of ESR in free radical biology and understanding the role of free radicals in signal transduction and apoptosis. Dr. Kalyanaraman serves as an Associate Editor for Free Radicals in Biology and Medicine, Free radical Research, and Biochemical Journal.

SHOZO TERO-KUBOTA, IES VICE-PRESIDENT ASIA-PACIFIC

sun.icrs.tohoku.ac.jp/labo/tero/main-j.html

Shozo Tero-Kubota received his BS degree in Applied Chemistry from the Yokohama National University, Yokohama, Japan, in

7 *Newsletter* Editor's Report (Laila Mosina)

Since the previous Annual Meeting of the IES in 2005 we prepared four issues of the *EPR newsletter*: 14/3, 14/4, 15/1, and 15/2 covered various aspects of the life of the EPR community. A sample copy of the latest issue of the *EPR newsletter*, 15/2, is displayed at the Conference Hall and provides a nice example of our work. We are proud that our Nobel issue 14/1-2 was a special success and that the NMR Division of Bruker ordered 250 extra copies for their customers.

On behalf of the Editorial Board, it is my pleasure to thank most heartily all contributors to the *EPR newsletter*. Their contributions make the *EPR newsletter* what it is. We are looking forward, with great anticipation, to the continuation of collaboration with our old friends and to discovering new ones.

Special thanks go out to the CEOs of the IES and editors of the columns in the *EPR newsletter*: Shirley Fairhurst, the source of important information and inspiration; John Pilbrow, the precious Encyclopedia of the history of the EPR community; Thomas Prisner, the creator of the topical 'Pro&Contra' column, Arthur Schweiger, the producer of brilliant ideas and the compass in the ocean of the EPR-related literature, and Stefan Stoll, the skilful and conscientious webmaster.

I am most appreciative of Bruker BioSpin for covering my travel expenses to Denver and of the warm and generous hospitality of Sandy and Gareth Eaton. It enabled my participation in this conference and provided me with the wonderful opportunity to meet people and to have plenty of discussions resulting in new ideas for the *EPR newsletter*.

This was followed by a discussion with members about the pros and cons of having a printed copy of the *newsletter*. Suggestions included: discontinue paper copy (H. Swartz), electronic version only would disadvantage some members (W. Trommer), extra charge for printed copy (R. Morse) or ask members for preference (W. Trommer).

8 Computer Special Interest Group Report

Members were reminded that the EPR-LIST remains active.To join send an e-mail to majordomo@xenon.che.ilstu.edu in the body of the e-mail, put only the words: *subscribe epr-list*. Contributions to the 'Computer Corner' in the newsletter are welcome. A list of software resources is due in September.

9 Any Other Business

Reef Morse asked for comments to his proposal that a special prize be introduced to recognise the importance of the role of Mentors in EPR. The prize, dedicated to the memory of Larry Kevan who mentored many of our members and prize winners, to be funded by contributions from members to a special endowment fund. Please send your comments to either Reef Morse or the IES Secretary.

10 Thanks

The IES thanks the following for their contributions in 2004–2005.

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We thank the *newsletter* Editor, Laila Mosina and her Associate Editors Graham Timmins, Thomas Prisner, and Takeji Takui, and the Technical Editor Sergei Akhmin, and Arthur Schweiger for hosting and maintaining the *newsletter* website. Special thanks to Bruker for covering the cost of distributing the *newsletter* and paying for the colour covers.

Thanks to all paid up members for without you there would be no Society. Thanks to Keith Madden of the Notre Dame Radiation Laboratory for taking notes at this meeting, and to Sandra and Gareth Eaton for allowing us to hold this meeting at their Symposium.

The meeting closed at 17:32.

★ IES BUSINESS ★ IES BUSINESS ★ IES BUSINESS ★ IES BUSINESS ★ IES BUSINESS ★ IES BUSINESS ★

New IES Executives

CARLO CORVAJA, IES VICE-PRESIDENT EUROPE

Carlo Corvaja was born in Venice (Italy) in 1937 and graduated in Chemistry at the University of Padova, were he is full Professor of Physical Chemistry since 1969. In 1974, he received his PhD in Chemistry from the Tohoku University, Sendai, Japan, and postdoctoral training at the University of British Columbia, Vancouver, BC, Canada. In 1976, he joined the Chemical Research Institute of Non-Aqueous Solutions at the Tohoku University, Sendai, Japan. In 1986, he became an Associate Professor in the Institute for Molecular Science. In 1988, he became an Associate Professor in the Chemical Research Institute of Non-Aqueous Solutions and in 1994 a Professor of the Institute for Chemical Reaction Science at the Tohoku University. Starting from 2001, he is Professor of the Institute of Multidisciplinary Research for Advanced Materials, Division of Materials Analysis at the Tohoku University. His research interests are centered on photochemistry and the application of ESR to the studies of free radicals and radical pairs. He is a member of the Society of Electron Spin Science and Technology.

1976. He is married and has four sons. His research activity covers many applications of EPR to the study of organic free radicals, photo-excited states and the interaction of free radicals with photo-excited molecules. In the last years his main interest was focused on EPR and time-resolved EPR of spin-labeled fullerene derivatives and of peptides, double-labeled with astable radical and a chromophore. Awards: (1990) Gold Medal of the Magnetic Resonance group of the Italian Chemical Society and (2001) IES Silver Medal for Chemistry shared with Seigo Yamauchi (Sendai). His hobbies are Spanish literature, photography of flora of the Alps, wild orchids and butterflies.

Awards

Nicolaas Bloembergen

Is Awarded the **2005 Russell Varian Prize** for 1947 Seed Contribution to NMR

On Tuesday, July 5, 2005, at the EUROMAR 2005 conference in Veldhoven, The Netherlands, Optical Sciences Professor Nicolaas Bloembergen received the 2005 Russell Varian Prize for the contribution

N. Bloembergen, E. M. Purcell, and R. V. Pound: *Nuclear Magnetic Relaxation*, Nature **160**, 475–476 (1947)

Dr. Bloembergen's contribution proposed a semi-quantitative prediction for Bloch's relaxation times T_1 and T_2, based on an appropriate adaptation of transition probability theory (as originally presented by Weisskopf and Wigner) combined with the assumption that relaxation is dominated by the effects of molecular Brownian motion on a 'fluctuating local field' acting on each spin. The paper introduced the notion of 'motional narrowing' and established NMR as an essential tool for the experimental study of molecular motion, a situation that still persists today.

The Russell Varian Prize honors the memory of the pioneer behind the first commercial Nuclear Magnetic Resonance spectrometers and cofounder of Varian Associates. The prize is awarded to a researcher based on a single innovative contribution, such as a single paper, patent, lecture, or piece of hardware, that has proven of high and broad impact on state-of-the-art NMR. In cases of multiple authorship, the prize is awarded to the author with the largest creative and innovative share of the contribution. The prize awards the earliest seed paper of an important technology rather than later, more comprehensive, and highly-quoted papers.

Another Passion

New Ideas in Old Books

Comments by

Gareth R. Eaton

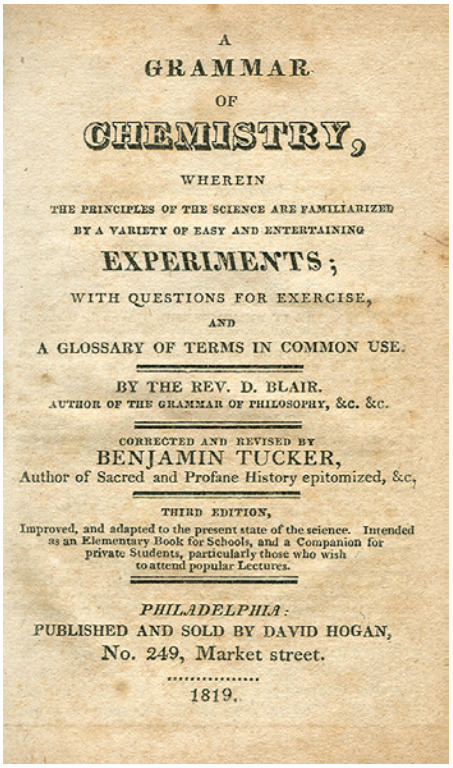
University of Denver, Denver, CO, USA

Laila Mosina observed old books in our home and asked me to write about them for the 'Another Passion' column in the *newsletter*. I hesitated doing so, because I would not label this a "passion". Further, the books I have are not really old by most people's standards. I would not even call myself a "collector" based on the descriptions in books about book collecting. Although I enjoy nice books, I do not select based on the quality of the cover. One of my favorite "bumper stickers" reads "Cheap thrills: Buy used books". I look for old science books that cost only a few dollars each. In fact, my interests, as will shortly become evident, are in books that no one else wants, so they do not cost much. I am interested in the development of ideas, and especially the time lag between the date that we all teach as the date of a scientific "discovery" and the time the ideas are taught in standard textbooks. Thus, I read old textbooks, which are almost without value on the used book market.

I do have some older books that were accidental discoveries in used book stores, including some that were discovered for me by Sandy's mother when she found out that a dusty old book was a better present than a new tie. The title page of one is shown in the picture. When I received this book, I did not even know that chemistry books were published in the United States as early as 1816. The 1st edition of the *Grammar of Chemistry* was published in 1810, the second in 1816, and the 3rd, which I have, in 1819. The Blair and Tucker book contains numerous experiments, a long list of questions for the student, and an extensive glossary (which serves to define for the modern reader many archaic terms). Chromium was discovered in 1797. Tucker says it was later found in combination with iron near Baltimore, and a description of "chrome" was added to the 1st American edition because of the colors of its combinations with metallic oxides, which could "form the finest paints" (page 68). The book also reports a recent discovery of a perpetual motion machine, consisting of columns containing several hundred disks of zinc and copper separated by paper,

which, when properly arranged, rang a bell. It worked for almost three years and "there appears every reason to believe that the action of a well-constructed column will be permanent" (page 22). It is strange that this was not recognized as a battery, given that Davy had used electrolysis already in 1807 to isolate potassium and sodium. One fascinating aspect of this book is the discussion of caloric and whether it is a "subtile fluid" or "a minute vibratory motion of the particles of bodies" (page 20). The 1819 edition quotes from papers presented in 1818 pro and con the role of oxygen and hydrogen as "the principle which communicates acidity" (page 34).

Another book I enjoy having, partly because of my scientific genealogy, even though it is not an "important" book, is *The New Chemistry* by Josiah Parsons Cooke, Professor of Chemistry at Harvard. The book was published in 1876, by D. Appleton and Company, New York, but the preface and copyright are dated 1873. He is credited with establishing the chemistry department at Harvard, shortly after he received his AB degree from Harvard in 1848. Cooke was the PhD thesis advisor of Theodore William Richards, whose determination of about half of the atomic weights earned him the Nobel Prize in 1914. (Richards was the first American chemist to win the prize; the first American scientist to win a Nobel prize was Michelson, 1907, in physics). Chester Alter went to Harvard to study with Richards the same year that Linus Pauling (Nobel prize, 1954) turned down an offer from Harvard because Cal Tech offered him more money. By this time Richards was in poor health, and Alter earned his PhD with Gregory P. Baxter, one of Richards' students. *Outlines of Theoretical Chemistry* by F. H. Getman and Farrington Daniels (1931) states (page 5) that "…the determinations carried out by T. W. Richards and his associates are universally regarded as masterpieces of experimental work". When I was a freshman (first-year college student in the US system), the legacy of Richards still dominated laboratory instruction, and we were given a reprint of an article by Richards on calibrating an analytical balance to follow in our first laboratory exercise. We had to use our calibrations throughout the freshman chemistry lab (George Shannon Forbes, another of Richard's students, was still in the Department). Graduate students may still select schools based on the stipend offered, but Freshmen don't calibrate double-pan balances any more. Chester Alter became Chancellor of the University of Denver (1953 to 1967).


A
GRAMMAR
OF
CHEMISTRY,
WHEREIN
THE PRINCIPLES OF THE SCIENCE ARE FAMILIARIZED
BY A VARIETY OF EASY AND ENTERTAINING
EXPERIMENTS;
WITH QUESTIONS FOR EXERCISE,
AND
A GLOSSARY OF TERMS IN COMMON USE.
BY THE REV. D. BLAIR.
AUTHOR OF THE GRAMMAR OF PHILOSOPHY, &c. &c.
CORRECTED AND REVISED BY
BENJAMIN TUCKER,
Author of Sacred and Profane History epitomized, &c,
THIRD EDITION,
Improved, and adapted to the present state of the science. Intended as an Elementary Book for Schools, and a Companion for private Students, particularly those who wish to attend popular Lectures.
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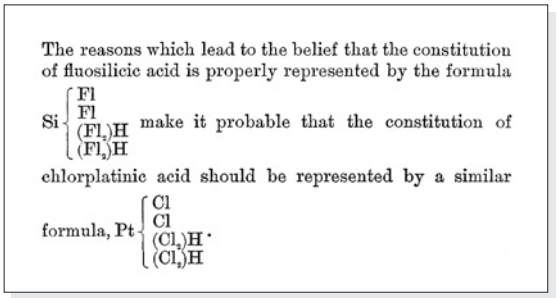
No. 249, Market street.
1819.

Another of Richards' students was James B. Conant, who became president of Harvard. In an interview in 2004, when he was 97 years old, Chester Alter stated that his first chemistry course was in 1924: "Textbooks then were probably 10 years behind current research. There was certainly no quantum mechanics in texts in those days despite the research activity related to structure". Dwight Smith, who was a teaching assistant to Linus Pauling at Cal Tech, later became Chairman of Chemistry (and hired me) and later Chancellor at the University of Denver (1984–1989). As an undergraduate I studied with William Lipscomb (who studied with Linus Pauling), and wrote a book about boron NMR with him that was published in 1969 (almost old enough to be worth collecting). Thus, many threads lead to and from an old book on my shelf.

Cooke's book is a set of "popular lectures" rather than a text book. He states that "for the past ten years, a great part of the intellectual force of the chemists of the world has been applied to the problem" of isomers. "The answer they have obtained is, that the difference in qualities depends on molecular structure…" (page 301). "The new chemistry assumes as its fundamental postulate that the magnitudes we call molecules are realities; but this is only a postulate. Grant the postulate and you will find that the rest follows as a necessary deduction. Deny it, and the "new chemistry" can have no meaning for you…" (page 75). How would chemical bonding be described before the discoveries of the electron and the nuclear atom? Cooke wrote "It is assumed that each of the elementary atoms has a certain definite number of bonds, and that by these alone it can be united to other atoms. If you wish to clothe this abstract idea in a material conception, picture these bonds as so many hooks, or, what is probably nearer the truth, regard them as poles like those of a magnet" (page 241). "The doctrine of quantivalence … is one of the distinctive features in which the new chemistry differs from the old, and the recognition of the fact that a definite quantivalence is an inherent quality of each elementary atom was one of the chief causes of the revolution in science what has recently taken place" (page 248). "Moreover, it appears that the qualities and chemical reactions of a compound are determined fully as much by the structure of its molecules as by the atoms of which the molecules consist" (page 249). How far could Cooke go almost simultaneous with the work of van't Hoff and LeBel? "It is perfectly possible that the atoms may be arranged so as to form regular geometrical figures, such as some theorists have amused themselves in constructing; but we do not pretend to have any accurate knowledge on this point" (page 227).

"Spectrum analysis, which has achieved such great results during the past few years, is based on" the colors of metallic elements in flames (page 199). "These colors are, in fact, very characteristic, and, when examined with the spectroscope, are condensed in luminous bands, whose positions on the scale of the instruments afford a never-failing indication of the presence of the metal in the flame" (page 257). This was fairly soon after Bunsen and Kirchhoff developed the spectroscope (1859), which was used in the discovery of many elements (e.g., Cs in 1860, Rb in 1861).

Elements of Modern Chemistry by Adolphe Wurtz, translated and edited, with the approbation of the author, from the fourth French edition by Wm. H. Greene, J. B. Lippincott & Co. Philadlphia, 1880. Strikingly, this book has a color frontispiece showing the solar spectum and the spectra of Li, Na, K, Sr, Ca, and Ba. "The idea of atoms is an hypothesis… It is more than an hypothesis: it is a theory. Chemists have universally adopted it, for it has rendered immense service to the science" (page 20). Sixty four elements are listed on page 39. The atomic composition of compounds was denoted with superscript numbers, rather than subscripts, and with vertical



The reasons which lead to the belief that the constitution of fluosilicic acid is properly represented by the formula

$$Si\begin{cases} Fl \\ Fl \\ (Fl_2)H \\ (Fl_2)H \end{cases}$$

make it probable that the constitution of chlorplatinic acid should be represented by a similar formula, $Pt\begin{cases} Cl \\ Cl \\ (Cl_2)H \\ (Cl_2)H \end{cases}$.

From Ira Remsen, *Inorganic Chemistry*, 1907.

listing of substituents bracketed within } or { to the left or right of one atom. The "capacity of combination" atoms have for each other is described as "atomicity" or "valence". Thus, nitrogen is "triatomic or trivalent" and carbon is "tetratomic or quadrivalent" (page 223). "When they combine, they exchange in some manner a unit of saturation" and this is represented by a dash between the atoms (page 224). "In these formulae a saturated atomicity is indicated by a line of union, two atomicities by two lines, etc." (page 401) resulting in modern looking structural formulae. Salammoniac (ammonium chloride) is "pentatomic" and is illustrated with a diagram with five lines from N to 4 H and Cl (page 480). Compounds such as pentane in which the atomicity of carbon was fully saturated were called saturated hydrocarbons. Isomerism included the concept of polymerism (page 413) for compounds with the same relative atomic composition but multiples of the numbers of atoms.

Atoms and molecules are still "hypothetical particles" (page 426) in *Inorganic Chemistry* by Ira Remsen, Henry Holt and Company, New York. The first edition was 1889. I have the Fifth Edition Revised, dated 1907 on the title page, but the Preface and copyright are dated 1898. About seventy elements were known. Many of the compounds are presented in the text in ways that look modern, such as $(NH_4)_2PtCl_6$, but then this is also written as $PtCl_2 \cdot 2NH_4Cl$. How this might be viewed in terms of bonding is revealed (or, obscured, from a modern perspective) by the representations of fluosilicic acid and chlorplatinic acid in the accompanying diagram from Remsen, page 729. The ideas of Werner had not reached this text.

Sometimes books contain surprises. *The Arrangement of Atoms in Space* by van't Hoff is a translated second edition (1898; the first edition was 1877), and the copy I have is "ex library" so it is almost without financial value. However, it contains an appendix on stereochemistry of inorganic substances by Alfred Werner (Nobel Prize 1913). Here, it is argued that isomers of transition metal complexes can be explained by "stereochemical conceptions" including square planar and octahedral arrangements of ligands. All inorganic chemistry courses now present these concepts as fundamental, and I lead students through the detailed arguments Werner used to convince the world of these stereochemical concepts. Note that Werner's "conclusive" experiment was performed in 1914.

Relative to the slow acceptance of stereochemical principles in other texts, note that van't Hoff credits Wislicenus for stimulating his ideas. Wislicenus said "The facts compel us to explain the difference between isomeric molecules possessing the same structural formulae by the different arrangement of their atoms in space" (page 2). For those of us who struggle to remember where we read something, there is some solace in van't Hoff's statement that "I could not find it again, and so cannot give the reference here". Wislecenus, in his 1884 preface to the 2nd edition, cites "Ber. 2, 550, and especially p. 620".

A Treatise on Physical Chemistry. A Cooperative Effort by a Group of Physical Chemists, edited by Hugh S. Taylor, and published in two volumes by Van Nostrand in 1924 shows how quickly new research reports can enter textbooks. The books have many references to the original literature, including some published in 1924. There is an extensive chapter on quantum theory. This text states for example, that it follows rather closely the arguments of Lewis (1923) and Langmuir (1919), including statements such as "Two octets may hold one, two, or sometimes even three pairs of electrons in common" (page 1073). Covalence is defined as the number of pairs of electrons which an atom can share with its neighbors. Recall that of the famous quantum mechanical papers, only those of Bohr and Sommerfeld had been published by this time. The chapter on quantum mechanics ends with the prognosis "It may, in the near future, even be possible to treat chemical reactions as transitions between stationary states defined by certain quantum numbers and energy levels".

This idiosyncratic summary is by no means a proper history of chemistry. By the purpose of this essay, the texts mentioned are limited to those in my library. Nevertheless, I hope to have conveyed a little about the history of ideas of chemistry, and the sometimes slow, sometimes rapid, incorporation of new ideas into textbooks. For insight into the history of ideas in EPR, please read *Foundations of Modern EPR* edited by Eaton, Eaton, and Salikhov, World Scientific, 1998.

Acknowledgements

Mrs. Vera Shaw gave me some of these interesting books. Dr. Bernard Spilka, Professor of Psychology at the University of Denver, called my attention to some of the books when they were donated to the University library book sales, and gave me books from his own collection. I also thank the many prior owners who disposed of the books that I found on dusty shelves of used book stores.

September 2005

70th Birthday of Hal Swartz

It is always hard to compliment Harold M. Swartz without realizing that he is a very young man. Although the records show that he's just turned 70 years of age, those of us admirers who are a decade (or two) younger on the Gregorian calendar are always reminded by Hal that we're his colleagues of advanced age!

Hal is truly a 'fountain of youth' of scientific and intrapersonal accomplishments. I had the honor, recently, in a meeting in Columbus Ohio, of naming him the great grandfather of biological EPR, a tribute that few scientists can hail.

Hal's accomplishments in the EPR field are numerous. His publication list exceeds 500 papers in well-regarded journals and books. He was responsible for establishing the first comprehensive EPR Center in the US as part of the NIH Research Resources program in the 1970's. What is phenomenal is that Hal then established another EPR Center at the University of Illinois, which was also the home of the International EPR Society – another courageous accomplishment that blossomed into a quite viable society that has been embraced by several 'sister' societies. That accomplishment notwithstanding, he then established a third NIH EPR Center at Dartmouth College Medical School, which had been the premier clinical EPR facility in the world. Somehow, during all of these activities, he's had an intense interest in bird watching in exotic regions of the world. Perhaps one of the issues of this newsletter will include some of his photographic collection and anecdotes.

Hal's accomplishments in biological EPR are too numerous to include here in toto. Some examples are development of a wide class of oxygen-sensitive inert EPR probes, detection and trapping of a wide variety of biologically relevant radicals and construction and demonstration of a portable EPR spectrometer. Two novel applications to humans that have been recently developed are long-term monitoring of oxygen tension in the feet of diabetics and EPR dosimetry of radiation exposure in teeth. We are confident that Hal's novel contributions will continues to blossom as he enters his next decade of this very productive, scientific life.

For this 'minibiographer' it has been an honor to have a close personal friend and colleague in Harold M. Swartz.

Lawrence J. Berliner
University of Denver

EPR in Oxford 50 Years Ago

Michael Baker

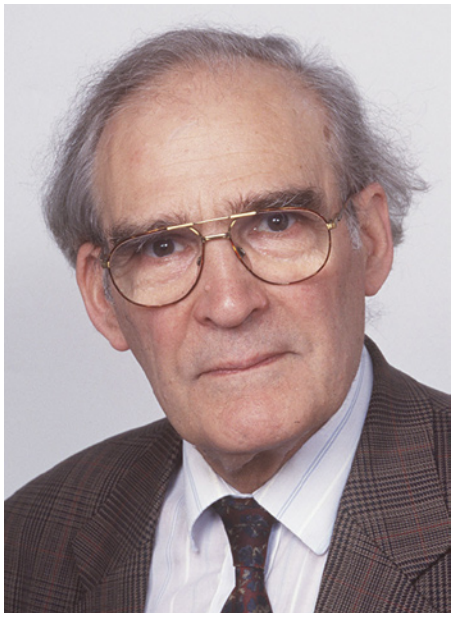
I started research in Brebis Bleaney's EPR group at the Clarendon Laboratory in Oxford in 1951. I have already given some impressions about the differences from now of EPR in the 1950's in my 90th birthday tribute to Brebis[1]. Here I want to add some more early memories of life in Brebis's group, which in common with most of the memories of my early life are associated with some sort of trauma. So it is not a continuous story; rather it is a series of snapshots.

The homebuilt spectrometers were very basic, so each student had his own dedicated equipment. This made them modular and very flexible, but also very idiosyncratic, which was an insurance against someone else's using one's equipment. It also meant that one could leave a specimen in the cavity until it was convenient to come back to it. Before the days of data averaging, experiments were fairly short, so life could be quite flexible: there was time for instance in summer to accept an invitation to join James Griffiths for a short walk into the adjacent University Parks to watch the University play cricket against English county sides, or to take a couple of hours off in the afternoon for a rowing session. The equipment and our working practices would have given nightmares to the modern health-and-safety-at-work inspectors.

There was an occasion when we played a prank on another graduate student in the group whose equipment we though especially hairy. We put around in various places in his equipment small quantities of nitrogen tri-iodide, an easily made powder, which is harmless when damp but explosive when it dries out. When our colleague started to use his spectrometer and it warmed up, "sparks" began to go off in various places. While he was taking things to pieces to try to trace the problem, Brebis arrived and joined in. "There were Amps in that spark" was one of his remarks. Of course, at this stage we had to confess.

On occasions, there could be real sparks. At one time I had to repair my 2 kV klystron power supply, and found a rather desiccated, presumably electrocuted mouse inside it! I have told one story about the hazards of using liquid hydrogen as a refrigerant[1]. The cavity was kept cold by immersing it in a double walled glass dewar cryostat of capacity a few hundred cubic centimeters, which was filled by pouring the liquid from a 4 litre glass transfer dewar and then raising the cryostat around the cavity, the latter being at the end of a short run of thin-walled german silver waveguide for thermal insulation. Then the magnet was wheeled into place around the cryostat. There was one occasion, on a Saturday morning, when my cryostat exploded, probably ignited by an internal electric spark. Fortunately, the pole pieces of the magnet protected me from most of the flying glass, so I ended up with a few pieces of glass in my thigh, minus eyebrows and eyelashes and with a very heavy tan on my face and hands. Brebis rushed me to the nearby Radcliffe Infirmary, where eventually around mid-day I underwent an operation under local anaesthetic to remove the glass fragments. This was another occasion indicative of the times. After half an hour or so into the operation, the surgeon told me that he was sorry that he now had to go to play rugby (after all it was Saturday afternoon) and that someone else would come soon to complete the operation!

Our main refrigerants were commercial liquid oxygen and liquid hydrogen made in a home-built liquefier in the Clarendon, very occasionally solid carbon dioxide: the use of liquid helium for EPR came later. These two were clearly hazardous, especially together. We pre-cooled the cavity with oxygen and then swapped dewars to one of hydrogen: some liquid oxygen trapped near the cavity during this procedure may have facilitated my explosion described above. Pumping on liquid oxygen to reduce the boiling temperature with an oil lubricated rotary pump could sometimes be dramatic. I also remember an occasion when we found in the lab one of the hydrogen transfer vessels I have described[1] with its cotton wool plug acting as a wick as the gently escaping hydrogen gas quietly burned![2]



My samples were home grown from aqueous solution. In my first year I grew complex cyanide crystals in a glass desiccator from dilute KCN solution in a small pot supported by a perforated zinc plate above concentrated sulphuric acid as the desiccant (in the lab so that I could easily keep an eye on the crystallisation, but not in a fume cupboard). One day, when opening the desiccator, I accidentally knocked over the vessel containing the solution, spilling it into the acid, so producing copious HCN and prompting a rapid evacuation of the lab followed by hurried sorties to open the windows while holding my breath!

Much of our work was done with enriched isotopes, to enhance the signal from the hyperfine structure of a rare or artificially made isotope. The chemistry for preparing the rather small water-soluble sample, ready for subsequent crystallisation, was done in the Clarendon. I remember our chemist showing me a graphic demonstration of surface tension when I objected to his waving about a centrifuge tube of a few millimeter diameter containing all of our expensive (both in money and time) sample. "Don't worry" he said, turning the tube upside down, "surface tension is a very strong force".

Another occasion when I got a nice demonstration of strong forces was when we had to take back to the manufacturers a box of ▶

electronics for stabilisation of a magnet power supply to sort out some teething problem (by then we had moved on a step by purchasing a new magnet and dedicated power supply). As the engineer was carrying the box back to our car, he accidentally dropped it in the car park, making a nasty dent in the tarmac. "Never mind" he said "all the components are tested to 10g"! He was right, it functioned OK afterwards.

The new magnet needed water cooling, which brought its own problem: flooding. We had no previous experience of this, as the early air-cooled magnets made by Tickford Ltd., the only commercially made part of the spectrometer apart from meters and electronic components (including the klystron), were robust. As I learned by experience, they even survived tipping over, making only a very loud noise and a nasty dent in the floorboards. Flooding was something different. The building was, even then nearly 50 years old, with cracks between the floorboards. Our lab was on the first floor, above that of another EPR group under Griffiths and Owen. Their lab was lit by eight or ten filament bulbs suspended from bushes in the ceiling by tubes of metal and surrounded by spherical glass lampshades about 30 cm diameter, like goldfish bowls. When our magnet flooded, the water drained between the floor boards and was funnelled down into the "goldfish bowls" below, which in succession were torn loose by the weight of water to fall crashing onto the spectrometers below. A glass sphere containing up to 10 kg of water falling through 3-4 metres makes a lot of noise and a lot of mess: and even once you realise what is happening there is not a lot you can do about it, unless you are brave enough to try to move apparatus and furniture out of the way, until all of the lampshades have fallen!

I have mentioned[1] the great value of the close interaction between experimentalists and professional theorists in Oxford. This interaction was educative on both sides. I remember an occasion when Maurice Pryce was sitting in my lab, watching and waiting for data, and he was not convinced that there was any signal on the oscilloscope trace. The signal was plotted out on the scope using a 50 Hz modulation of the magnetic field through much more than the line width, so giving a scope trace of signal versus magnetic field for the range of the modulation. If signal/noise was low, one needed an eagle eye to spot the mouse in the grass as the steady field was cranked up. Maurice was convinced only when we kept on coming up with the same value of line position each time we measured it.

I have dwelt on the dramatic, but it was a great time to be doing EPR at the Clarendon, because one was part of a large mutually stimulating community of groups doing resonance under Bleaney, Griffiths & Owen (also EPR), Bagguley (FMR), Woodgate (atomic beams), Robinson (NMR), Edmonds (NQR), to say nothing of the large number of theorists devoting their energy to thinking about interpretations and models, and producing rapid and stimulating feedback.

Notes

[1] 90th Birthday of Brebis Bleaney, *EPR newsletter*, vol. 15, no. 2, 2005.

[2] It is not only these chemically active refrigerants that can cause problems. Within the last few years we have had a problem with liquid nitrogen, which because of some blockage, was forced to siphon through a line taken from the top of the Clarendon's liquid nitrogen storage tank intended to bleed off dry nitrogen gas for use in our spectrometers. This spilled into the lab and filled it with nitrogen gas, asphyxiating a Russian visitor. Fortunately the lab had glass doors, so that he was spotted lying unconscious on the floor and was pulled to safety in time.

Jacques Pescia (1931–2000)

Professor Jacques Pescia, one of the pioneers of Electron Paramagnetic Resonance (EPR) research in France, passed away in April 2000. He was still active in EPR research during the months preceding his death. He is survived by his wife Nicole, daughter Carole, sons Olivier and Gerald, and grandchildren Domitille, Philippine, Guillemette, Priscille and Aurelie.

Jacques Pescia was born on January 26, 1931 at Bourg-la-Reine, France. After his schooling at the Lycee Lakanal in Sceaux, near Paris, he studied at the Faculty of Science, Paris from 1950–57. Following two years of military service from 1957–59 in Algeria, he returned to France where he joined the Faculty of Science at the beginning of 1959 as a member of the Electronics Laboratory. By the end of 1959, he was appointed as a research assistant to work on spin-lattice relaxation.

He carried out research under the direction of Professor P. Grivet, submitting his thesis entitled "Measurement of Very Short Spin-lattice Relaxation Times" at CNRS (National Center for Scientific Research), Faculty of Science, Orsay, Paris in 1964. The chair of his thesis committee was Dr. Kaslter, who won the Nobel Prize in Physics in 1966.

He was promoted to the position of chargé de recherche at CNRS in 1964. In 1965 he left for Toulouse, France and joined INSA, (National Institute of Applied Sciences), Paul Sabatier University, as a full professor. In November of that year, he set up the Laboratory of Magnetism and Quantum Electronics.

Jacques PESCIA concentrated his research activities on experimental Electron Paramagnetic Resonance (EPR), specifically on spin-lattice relaxation times of paramagnetic ions, denoted by T_1. The relaxation times that he measured, were extremely short, significantly shorter than those encountered in NMR, between 10^{-6} and 10^{-10} s. During his doctoral thesis research, he and his colleague J. Hervé developed a new technique to measure such very short relaxation times, wherein the microwave field, responsible for transitions between Zeeman levels, is modulated in amplitude. An emf is thus induced in a pick-up coil, coaxial with the static magnetic field. The relaxation time T_1 is then determined from the induced emf as a function of the frequency of the amplitude modulation.

At the Laboratory in Toulouse, he continued his research using the amplitude-modulation spectrometer he constructed. He investigated relaxation of paramagnetic species, such as free radicals, metals, semi-conductors, transition-metal ions (iron group, rare-earths), excited states of phosphorescent molecules, living cells for studying cancer, uni-dimensional compounds, xerogels and fractal materials. He was fascinated by the latter two right up to his retirement. He continued his investigations to demonstrate the existence of spin-fracton relaxation to verify the predictions of Ray Orbach and collaborators. Indeed, in collaboration with Professor Sushil Misra of Concordia University, Canada, and a doctoral student Zaripov, the evidence of spin-fracton relaxation was found. This research was published in the prestigious journal *Physical Review Letters* in 1999 (vol. 83, pp. 1866–1869).

He developed many contacts with industry, the most significant one being signed with a French petrochemical company for EPR characterization of materials. His other industry contacts were with a big laboratory for studying CTN thermistors, ANVAR (the National Agency for the Evaluation of Research), for a study of nickel mangnetites and their applications to study ceramics, a civil aeronautical giant to investigate problems of electromagnetic compatibility encountered in the development of new airplanes, and a joint venture with pharmaceutical companies to characterize medicines using EPR.

Jacques Pescia taught a variety of courses: electromagnetic theory, microwaves, analogue electronics, waves and transmission of signals, and passive components. He was appointed Head of the EEA (Electronics, Electronic Technology, and Automation) Department in the Professional Faculty of Paul Sabatier university in 1989. He trained numerous doctoral students who are now well placed in universities in France and abroad. Some of them are employed by industrial companies as research engineers and administrators.

Jacques Pescia published over 120 articles in reputable scientific journals, such as *Physical Review B*, *Journal of Physics E*, *F*, as well as research communications in meetings of the French Academy of Sciences. Shortly

before his retirement he wrote a chapter entitled "Microwave amplitude Modulation in EPR and short T_1 measurement" in the book *Foundations of Modern EPR*, edited by G. Eaton, S. Eaton, and K. M. Salikhov in 1997 by Word Scientific publishers.

Professor Pescia was not only a researcher, he had another passion – the violin. In Paris, he gave many amateur concerts. While in Toulouse, he gave chamber music courses.

Currently there are efforts being made to develop Pescia's amplitude-modulation technique with a better design using the latest advances, such as dielectric and crossed-loop resonators to measure very short T_1 times.

Sushil Misra

Clyde A. Hutchison Jr. (1913–2005)*

Professor in Chemistry Clyde Hutchison Jr., a pioneer in the science of magnetic resonance spectroscopy, a technique that led to useful medical and technological insights into the magnetic properties of matter, died Monday, Aug. 29 of prostate cancer in the Montgomery Place Retirement Community in Chicago. He was 92.

Hutchison adopted electron magnetic resonance spectroscopy shortly after its invention, said John Weil, professor emeritus of chemistry and physics at the University of Saskatchewan, Canada. "He started out as a pioneer in that field at the beginning and had a genius for discerning important projects", Weil said. "There were no textbooks then. There were no manufacturers of instruments. I was in on that generation. We had to learn it for ourselves because there was nothing yet in the libraries."

Nuclear and electronic magnetic resonance spectroscopy eventually gave birth to magnetic resonance imaging, which is widely used in medicine and in studying the physics of solids, said Weil, who received his PhD in chemistry in 1955 at Chicago under Hutchison's tutelage. Hutchison, working at first

with military surplus equipment, used the technique to study fundamental scientific questions about the magnetic properties of single atoms and molecules.

Born May 5, 1913, in Alliance, Ohio, Hutchison received his BS in 1933 from Cedarville College and his PhD from Ohio State University in 1937. He then went to Columbia University as a National Research Council Fellow and worked with Nobel laureate Harold Urey. In 1939, he left Columbia to become an assistant professor of chemistry at the University of Buffalo. During the war years, Hutchison participated in the Manhattan Project to develop the atomic bomb, while at Columbia University and the University of Virginia. In 1946, he was appointed to the second executive committee of the Atomic Scientists of Chicago, a group that organized to campaign for the peaceful use of nuclear power under international control. Hutchison became an Assistant Professor in Chemistry at the University in 1945 and served as Chairman of the Chemistry Department from 1959 to 1963. He retired as the Carl William Eisendrath Distinguished Service Professor in Chemistry in 1983.

He was editor of the *Journal of Chemical Physics* from 1953 to 1959 and a consultant to Argonne and Los Alamos national laboratories for many years. He served as a visiting lecturer or professor at many universities around the world, including the Weizmann Institute of Science in Israel in 1970. He also was the John Simon Guggenheim Memorial Foundation Fellow to Oxford University from 1955 to 1956 and from 1972 to 1973, as well as the George Eastman Professor at Oxford's Clarendon Laboratory from 1981 to 1982.

Hutchison received many honors, including an honorary doctoral degree from Cedarville College and the Peter Debye Award in Physical Chemistry from the American Chemical Society. He was elected to membership in the National Academy of Sciences and was a fellow of the American Academy of Arts and Sciences. He shares both distinctions with his son, Clyde Hutchison III, a professor emeritus of microbiology at the University of North Carolina, Chapel Hill, and a distinguished investigator of the J. Craig Venter Institute.

Hutchison married Sarah Jane West in 1937. She died in 1997. A sister, two sons, a daughter and four grandchildren survive him. Arrangements are pending for a memorial service in November.

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Notices of Meetings

6th meeting of the Australian and New Zealand Society for Magnetic Resonance **ANZMAG 2006**

Murramarang National Park, Australia
February 12–16, 2006
www.anzmag.com.au/anzmag06/index.html

Scientific program

The ANZMAG conference covers a wide range of magnetic resonance techniques and applications, including high-resolution and solid-state NMR spectroscopy, EPR and imaging.

Eight international speakers have accepted our invitations to speak at the meeting:

- *Prof. Geoffrey Bodenhausen*, ENS Paris: New methods for high-resolution NMR of biomolecules
- *Prof. Malcolm Levitt*, Southampton: Solid state NMR of membrane proteins
- *Dr. Claudio Dalvit*, Nerviano Medical Sciences, Milano: NMR screening of chemical libraries
- *Prof. Jörg Kärger*, University Leipzig: Diffusion in zeolites and other microporous solids
- *Prof. Wolfgang Lubitz*, Max-Planck-Institute Mülheim: EPR of the photoreaction system
- *Prof. Claudio Luchinat*, CERM Florence: NMR of paramagnetic molecules
- *Prof. Paul Matthews*, Oxford: Functional magnetic resonance imaging in neuroscience
- *Prof. Gerhard Wagner*, Harvard Medical School: NMR structures of proteins and protein-protein complexes in cell-signaling

Presentations will also be given from Australian and New Zealand researchers – both as invited talks and as talks selected from submitted abstracts.

Two poster sessions and the vendors displays will provide a comprehensive overview over current activities and developments.

Contact

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The 39th Annual International Meeting **Advanced Techniques & Applications of EPR**

University of Edinburgh, Edinburgh
April 2–5, 2006
www.esr-group.org.uk

(for details see forthcoming issues)

Conference Reports

28th International EPR Symposium

Denver, Colorado, USA
July 31 – August 4, 2005

The meeting was attended by about 125 participants from many countries. On Sunday afternoon there was a workshop at the University of Denver on "Selection of Resonators" that was sponsored by Bruker BioSpin and the University of Denver. The Monday session, organized by Hassane Mchaourab and Y.-K. Shi, discussed Spin-Labeling: From Spectral Parameters to Protein Structure and included talks by students who had received travel awards to participate in the conference. The conference plenary lecture by Robert Crabtree, Argonne National Laboratory, was entitled "The Hydrogen Economy". Tuesday morning there was a joint NMR/EPR session on "Structure Determination in Proteins", organized by Sarah Larsen. The Lawrence Piette Memorial Lecture was presented by Prof. Harold Swartz. The Wednesday morning session, organized by Raman Kalyanaraman, concerned "Tyrosyl Radicals in Biological Systems". The Thursday morning session concerned advances in EPR Instrumentation. Poster sessions provided excellent opportunities for extended discussions.

The 29th EPR Symposium will be held at Beaver Run Resort in Breckenridge, Colorado July 23–26, 2006. Papers on all aspects of EPR are invited. Information updates will be provided at www.epr-symposium.du.edu.

Sandra and Gareth Eaton

Hall Swartz (left), Jim Hyde (center), and Howard Halpern (right).

Alex Smirnov (left), Peter Fajer (center), David Singel (right), and Glenn Millhauser (one just sees the side of his head).

International Conference on Biomedical EPR Spectroscopy **EPR2005**

Columbus, Ohio, USA
September 4–9, 2005

A joint conference of the 11th in vivo Electron Paramagnetic Resonance (EPR) Spectroscopy and Imaging and the 8th International EPR Spin Trapping was held from September 4–8, 2005 under the auspices of The Ohio State University, Columbus, OH. The conference was inaugurated at the Dorothy M. Davis Heart and Lung Research Institute on September 4, 2005 followed by the first session of the conference. The rest of the conference was held at the Columbus Hilton Hotel & Conference Center in the Easton Town. Nearly 200 participants from 18 different countries attended the conference. The topics of discussion spanned from in vitro detection of free radicals to clinical measurement of oxygen concentration using the EPR spectroscopy. Plenary lectures were given by Dr. B. Kalyanaraman of the Medical College of Wisconsin, Dr. James B. Mitchell of the National Cancer Institute, and Dr. Jay L. Zweier of the Ohio State University. The highlight of the conference was the talk given by Prof. Albert Overhauser of the physics department of the Purdue University in which Prof. Overhauser gave a detailed account on how he invented the phenomenon of dynamic nuclear polariza-

tion 52 years ago that has revolutionized the MRI technology.

Three eminent EPR scientists were recognized at the conference. Prof. Lawrence J. Berliner, the then Professor of Chemistry at the Ohio State University and currently Professor and Chair of Department of Chemistry and Biochemistry at the University of Denver, Colorado, was honored with Lifetime Achievement Award for his 35 years of pioneering research in the field of biological magnetic resonance spectroscopy. Prof. P. T. Manoharan, Professor Emeritus of Chemistry, Department of Chemistry – Sophisticated Analytical Instruments Facility, the Indian Institute of Technology, Chennai, India was honored with Lifetime Achievement Award for his outstanding service as a mentor, scientist, and promoter of EPR spectroscopy. Professor Harold M. Swartz of the Dartmouth Medical School, Hanover, New Hampshire has been elected as a member of the International EPR Society (IES) and was awarded Gold Medal for serving as the founder president of IES by Dr. Ronald Mason on behalf of the society.

On September 5, 2005, following the plenary lecture by Dr. B. Kalyanaraman on "Biological spin-trapping: Recent developments" two sessions on "EPR spin-trapping applications" (chaired by Drs. B. Kalyanaraman and G. R. Buettner) and "Spin probes for radical biology and medicine" (chaired by Drs. V. Khramtsov and A. Samuni) were held, in which 21 lectures were given by specialists pertinent to the sessions.

On September 6, 2005, following the plenary lecture on "Chasing free radicals: Therapeutic applications of nitroxides" by Dr. J. B. Mitchell of the National Cancer Institute, Bethesda, MD, two sessions on "Nitric oxide, nitroxides and spin labeling" (chaired by Drs. P. T. Manoharan and J. B. Mitchell) and "Instrumentation" (chaired by Drs. G. R. Eaton and S. Subramanian) were held, in which 22 lectures were given by specialists in various fields relevant to the sessions.

On September 7, 2005, following the plenary lecture on "Ex vivo and in vivo EPR spectroscopy and imaging of free radicals and oxygen in the heart" by Dr. Jay L. Zweier, Davis Heart and Lung Research Institute, the Ohio State University, Columbus, OH, two sessions on "In vivo EPR spectroscopy and imaging" (chaired by Drs. H. J. Halpern and H. Utsumi) and "SMART: EPRI/MRI/PEDRI" (chaired by Drs. Murali Krishna and Albert Overhauser) were held in which 18 lectures were given by specialists in various areas relevant to the sessions.

On September 8, 2005, before the commencement of the morning session, the Inaugural Conference for the Comprehensive Wound Center (CWC), the Ohio State University, Columbus, OH was held. Dr. Chandan Sen, director of the CWC delivered the welcome address and the confer- ▶

★ QUIZ WINNER ★ QUIZ WINNER ★

Our quiz of *EPR newsletter* 14/4

We are glad to announce the answer to the question what International Society, when and where posthumously awarded E. K. Zavoisky in recognition of his discovery of electron paramagnetic resonance: International Society of Magnetic Resonance (ISMAR) awarded the prize to E. Zavoisky (together with R. Blinc) in 1977 at the 6th ISMAR Meeting in Banff, Canada.

The winner is **Nataliya Yakovleva** (Kazan State University, Kazan). She will get a special envelope issued in 1994 to mark the 50th anniversary of this discovery and stamped in Kazan with a special stamp during the 27th AMPERE Congress, August 21–28, 1994, together with a photo of E. K. Zavoisky.

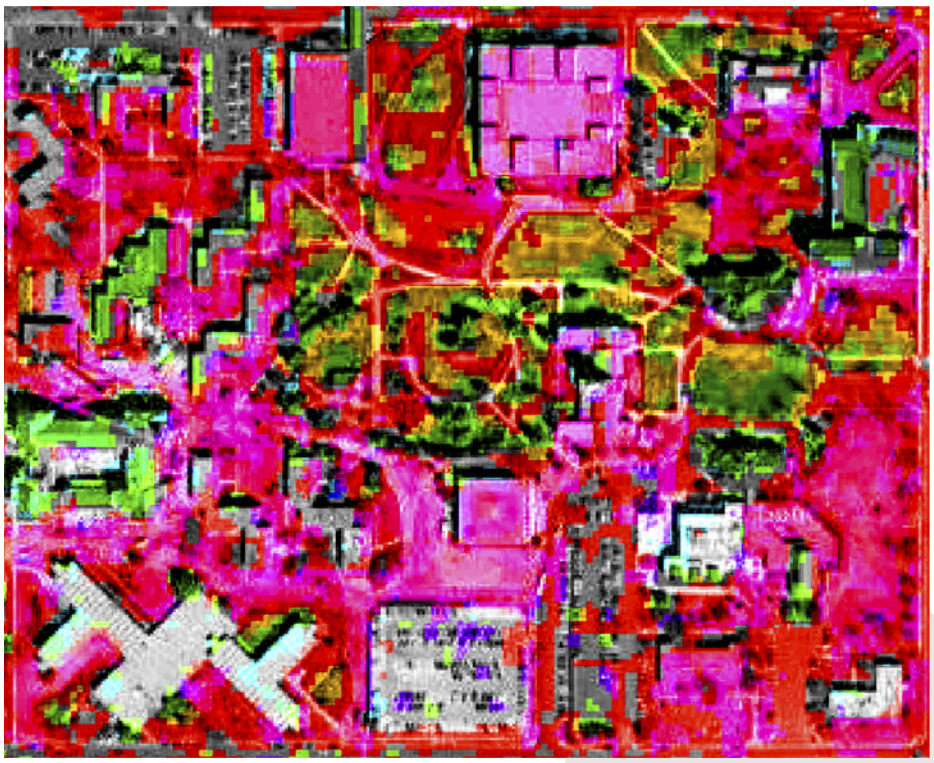
The EPR community has available to it a list server. The address is epr-list@xenon.che.ilstu.edu.
To subscribe to the list, send the words SUBSCRIBE epr-list to majordomo@xenon.che.ilstu.edu.
That sends a message to Reef Morse who will then manually place you on the list. This honors only legitimate requests to join the list. Reef also moderates the list which keeps it spam-free.

★ QUIZ WINNER ★ QUIZ WINNER ★

Our quiz of *EPR newsletter* 15/1

We are glad to announce the answer to the question what the logo of the World Year of Physics 2005 symbolizes: The logo of the World Year of Physics 2005 symbolizes the "space-time continuum".

The winner is **Himansu Kumar Kundu** (Geochronology and Isotope Geology Division, Geological Survey of India, Calcutta). He will get an Einstein poster.



A masterpiece or a kid's doodle?

ence was inaugurated by Dr. Karen Holbrook, President, the Ohio State University and Dr. C. Ellison, chairman, department of surgery, the Ohio State University. Three plenary lectures on "Oxygen and wound healing: Reactive oxygen and lactate as signals for repair" by Dr. T. K. Hunt (University of California at San Francisco), "The regulatory neutrophil" by Dr. J. Albina (Brown University, Providence, RI), and "Stress and wound healing: From endocrinology and cytokines to the screening of transcriptome" by Dr. R. Glaser (the Ohio State University, Columbus, OH) were given at the beginning of the session. Amalgamation of the wound healing conference with the EPR conference fostered the interdisciplinary and translational aspects of both disciplines.

Following the plenary lectures on September 8, 2005, two sessions on "In vivo EPR oximetry-clinical applications" (chaired by Dr. H. Swartz and T. K. Hunt in the morning and by Drs. Gallez and Heiss in the afternoon) were held, in which 13 lectures were given by specialists in the areas pertinent to the sessions. Professor Lawrence J. Berliner gave the concluding talk on "Spin trapping and in vivo EPR (ESR/EMR): Past, present and future directions". In the evenings, throughout the conference, after the lecture sessions, posters were displayed for viewing.

The conference supported 32 young investigators to attend the conference that otherwise would have been unable to participate in the conference. The conference was organized by Dr. Periannan Kuppusamy and supported by the National Institutes of Health and College of Medicine of the Ohio State University.

Periannan Kuppusamy

■

This meeting was joint between the In-vivo EPR and Spin Trapping meetings, which has now started a tradition that will continue into future meetings. The marriage of the in-vivo EPR community and spin trapping enthusiasts led to an extremely productive meeting with a broad exchange of ideas and collaborative research ideas. The last day of the meeting was joint with yet another group with interests in wound healing. One mutual area of interest was the importance of oxygen in wound healing, where the EPR technique has unique advantages in sensitivity. Again, merging interdisciplinary groups of this sort was clever and farsighted. Periannan Kuppusamy organized and orchestrated every detail of this quite productive and enjoyable meeting.

The subjects covered were: EPR spin-trapping applications, spin probes for free radical biology and medicine, nitric oxide, nitroxides, and spin labeling, instrumentation (including EPR microscopy), in vivo EPR spectroscopy and imaging (particularly instrumental methods), smart methods: EPRI/MRI/PEDRI, and in vivo EPR oximetry/clinical applications.

The meeting culminated with an awards banquet honoring Harold M. Swartz as a new Fellow of the International EPR Society (which he founded many years ago). In addition, two Lifetime Achievement Awards were presented to P. T. Manohoran (India) and L. J. Berliner (USA).

Larry Berliner

For Your Perusal

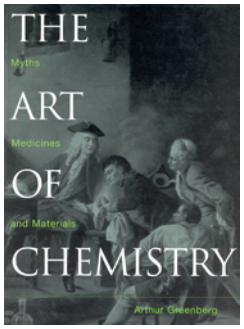
Collected by Arthur Schweiger

In this column, new books, journals and reviews on EPR, or literature closely related to EPR, as well as literature in the field of natural science which might be of interest to the reader are presented and briefly reviewed. The column usually covers material published starting from 2002 up to date; completeness with respect to the EPR literature is not claimed.

Books

The Art of Chemistry: Myths, Medicines, and Materials

Arthur Greenberg



Price: $ 70 (Hardcover)
Publication date: November, 2002
Publisher: Wiley-Interscience
384 pages

A fascinating book, full of magic and charm, the proper reading for long and cold evenings at wintertime.

From the book description: The focus here is on chemical artwork, 188 figures accompanied by 72 essays geared to educated but not expert readers. The first section dwells upon spiritual and mythological imagery such as winged dragons, witches, basilisks, and the ouroboros, the snake- eating-its-tail-metaphor for the conservation of energy. Subsequent sections deal with early chemical technology; the discipline's emergence from the mid-1600s to the mid-1700s; chemistry in 18th-century France; chemistry in 19th-century America; specializations, such as organic chemistry; and a view to chemistry's future providing cursory treatment of subjects like nanotechnology and self-organization.

Some reviews:

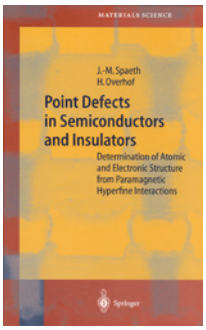
"This is a beautifully illustrated book… which is both informative and entertaining." (The Catalyst)

"…*The Art of Chemistry* is well written and peppered with Greenberg's witty comments…The more of the book I read, the more I kept on wanting to read…" (Nature)

"…the reader follows the author… with interest and pleasure… due not only to the clever way in which this immense amount of historical material has been arranged, but also to his talent as a storyteller. To learn something important in a short time and in an amusing way-what more could one wish for?" (Angewandte Chemie, International Edition)

Point Defects in Semiconductors and Insulators

Johann-Martin Spaeth and Harald Overhof



Price: $ 119 (Hardcover)
Publication date: February, 2004
Publisher: Springer-Verlag
490 pages

This book, written by two top experts in the fields of magnetic resonance applied to defect centers (Johann-Martin Spaeth) and theoretical solid state physics (Harald Overhof), is highly recommended not only to those who study defect centers, but also to EPR spectroscopists who are interested in advanced EPR techniques, in particular in ENDOR, optically-detected EPR, and electrical detection.

From the book description: *Point Defects in Semiconductors and Insulators* introduces the principles and techniques of modern EPR spectroscopy that are essential for determining microscopic defect structures. Many different magnetic resonance methods are required to investigate the microscopic and electronic properties of solids and uncovering correlations between those properties. In addition to EPR, such methods include ENDOR, electronically and optically detected EPR, and electronically and optically detected ENDOR. This book comprehensively discusses experimental, technological, and theoretical aspects of these techniques from a practical point of view, with examples of semiconductors and insulators. While the non-specialist learns about the potential of the different methods, the researcher finds help in the application of commercial apparatus and guidance from ab initio theory for deriving structure models from data.

The Physical Principles of Electron Paramagnetic Resonance

George E. Pake and Thomas L. Estle

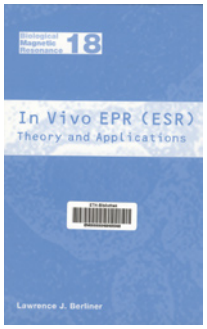
Price: you can buy this book used in second-hand webshops (Hardcover)
Publication date: September, 1973
Publisher: W. A. Benjamin, 2nd edn.
306 pages

Although published already 32 year ago, it is of much more than only of historical interest. I can highly recommend it to students looking for an introductory text about EPR.

Contents:

In Vivo EPR (ESR): Theory and Applications

(*Biological Magnetic Resonance*, 18)
Lawrence J. Berliner (ed.)



Price: $ 175 (Hardcover)
Publication date: November, 2003
Publisher: Kluwer Academic/ Plenum Publishers
647 pages

In vivo EPR and in particular EPR imaging seems to become mature now. To have the many different techniques and applications of this fast growing field of EPR presented in one volume is exceedingly deserving.

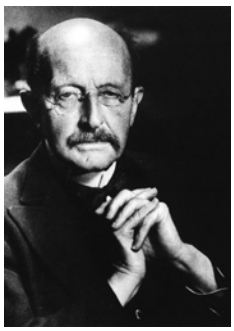
From the book description: *In Vivo EPR (ESR)* is a textbook on this relatively new subject in biomedical electron spin resonance.

While a few chapters have appeared in special topics volumes in this series, this book covers the principles and theory, instrumentation as well as the latest applications at the time of its writing. The book is divided into two major sections dealing with theory and instrumentation, and aspects of biochemistry, in vitro and in vivo applications. A significant amount of detail is devoted to clinical applications and the problems and pitfalls encountered in vivo spectroscopy and imaging.

Audio-CD

Wissenschaft und Leben

Max Planck and Klaus Sander



Price: EUR 24.80
Original audio recordings
2-CD set, 105 minutes,
together with a booklet
(24 pages)
Publication date: 2003
Publisher: Suppose Verlag

In 1900 on the basis of his epoch-making talks on quantum theory the physicist Max Planck (1858–1947) introduced new physical conceptions and established new views. For his discovery of the natural constant h and the development of the formula $E = h\nu$, in 1918 he was awarded the Nobel Prize. Planck also dealed with philosophical problems of modern natural science, which he tried to arrange for a broad public, in written form and spoken language. The double CD unites his autobiographic and philosophical contributions of the 30s and 40s. This two CD's probably represent the only existing audio recordings of Planck.

The recordings are all in German. The quality of the sound is amazingly good considering their age. In some recordings one can even hear the rustling of the manuscripts. Fluctuations in the volume or noise impair the hearing pleasure only very rarely.

Contents:

CD1: The nature of science / The meaning of exact science / The function of science / Causality and free will / Religion and natural science

CD2: Self-portrayal / Ceremony for the 80th birthday / At present time / Leibniz meeting / Göttingen

Reviews

Paramagnetic Spectroscopy of Vanadyl Complexes and Its Application to Biological Systems

Th. S. Smith II, R. LoBrutto, and V. L. Pecoraro

Coord. Chem. Rev. **228**, 1–18 (2002)

A useful overview about EPR, ENDOR and one- and two-dimensional ESEEM studies of vanadium(IV) complexes

Abstract: The ability to determine the ligand environment around vanadium(IV), usually as the vanadyl ion (VO^{2+}), has become crucial to the understanding of many biological systems. In addition to those systems in which vanadium naturally occurs, the vanadyl ion has found favor as a spectroscopic probe in place of spectroscopically silent cations, EPR, ESEEM, and ENDOR spectroscopies are the tools of choice for examining these paramagnetic systems. A variety of model complex studies allow good comparisons to be made to known vanadium environments. The complimentary nature of the strengths and weaknesses of these techniques can combine to give an accurate picture of the metal ligation in a number of cases herein.

Determination of the Nanostructure of Polymer Materials by Electron Paramagnetic Resonance Spectroscopy

G. Jeschke

Macromol. Rapid Commun. **23**, 227–246 (2002)

A very concise review about one of the booming fields of EPR

From the abstract: EPR spectroscopy is one the few methods that can characterize structural features in the range between 0.5 and 5 nm in systems that lack long-range order. Approaches based on EPR spectroscopy provide good structural contrast even in complex materials, as the sites of interest can be selectively labeled or addressed by suitably functionalized spin probes using well established techniques. This article assesses the EPR experiments available for distance measurements on nanoscales in terms of the accessible distance range, precision, and sensitivity. Both simple and sophisticated methods for data analysis are described and their limitations are evaluated. Finally, applications to the study of polymer chain conformation and the structure of ionically functionalized diblock copolymers are highlighted.

Market Place

POSITIONS

Postdoctoral Position in EPR Studies of Bio/Nano Systems

Applications are invited for a postdoctoral position in the Department of Physics at Boise State University to work in the area of electron paramagnetic resonance spectroscopy. The successful applicant will employ EPR in the studies of biomolecular and nanoscale systems in collaboration with researchers from biology, chemistry, materials science and engineering disciplines at Boise State University, and with scientists at national level EPR user facilities. Applicants must have a PhD in physics, chemistry, materials science, or a related field, and significant experience in the EPR samples preparation, data collection, analysis, and spectral simulations of solid and liquid samples. Experience with EPR studies of proteins and other biomolecular systems, spin labeled systems and/or bio/nano sensors will be a plus. Women and minorities are encouraged to apply. To be considered, the following materials are required: (i) Vitae and list of publications, (ii) A summary of previous/current research in relation to the abovementioned areas (maximum of 2 pages), (iii) copies of two most important EPR-based publications, and (iv) a list of three references.

Applications may be submitted by e-mail: apunnoos@boisestate.edu, or mail to Dr. Alex Punnoose, Department of Physics, Boise State University, Boise, ID 83725-1570. The appointment is for one to three years, depending on project funding and performance.

Research Associate
Chemistry of EPR Oximetry Materials

We seek a motivated individual with background in EPR (ESR) spectroscopy, chemistry or physics to join a research team developing and evaluating materials for in vivo quantification of O_2 (oximetry). The project involves preparation of paramagnetic materials that are carbon-based (chars) and/or built on molecular scaffolds, and characterization of their physical, electronic and magnetic resonance properties. The biological and clinical performance of these materials will be evaluated through collaborative studies at the EPR Center for Viable Systems at Dartmouth Medical School (www.dartmouth.edu/~eprctr/). Salary will be commensurate with training and experience.

Please contact: Prof. Dean Wilcox, Department of Chemistry, Dartmouth College, Hanover, NH 03755 (dean.wilcox@dartmouth.edu; 603-646-2874) or Prof. Harold Swartz, EPR Center for Viable Systems, Dartmouth Medical School, Hanover, NH 03755 (harold.swartz@dartmouth.edu; 603-650-1955)

Postdoctoral Positions Available at Davis Heart and Lung Research Institute, The Ohio State University

A position is available for a scientist with experience in magnetic resonance instrumentation development and application. The candidate should

have experience in EPR/MR hardware or software development and applications to chemical or biological systems. Salary commensurate with experience. Please reference PA06 in your application.

A position is available for a scientist with experience in cardiac NMR spectroscopy or imaging research to perform isolated heart and in vivo studies of alterations in myocardial energetics and metabolism in the postischemic heart. Salary commensurate with experience. Please reference PA07 in your application.

The Ohio State University is an equal opportunity/affirmative action employer. Qualified women, minorities, Vietnam era veterans and individuals with disabilities are encouraged to apply.

Send CV to:

Dr. Jay Zweier, 473 West 12th Avenue, Room 110, Columbus, Ohio 43210 or zweier-1@medctr.osu.edu.

Full Time Research Associate Position at The University of Chicago

The University of Chicago's Department of Radiation and Cellular Oncology is seeking a qualified applicant for full time Research Associate position. The primary activity of a Research Associate is academic research in associate with faculty member or team. An opening currently exists in a research team studying and developing of novel Electron Paramagnetic Resonance based images of aspects of the physiologic milieu, particularly quantitative images of oxygen concentrations in the tissues of a living animal. This is part of the Center for EPR Imaging in Vivo Physiology, a federally funded multi-institutional research resource. The person selected for this position will work with a consortium of medical physicists, chemists, engineers and biologists.

The work will involve developing

– instrumentation for novel EPR spectral spatial imaging strategies using both continuous wave and pulsed acquisition techniques at radiofrequency (~250 MHz)
– novel projection acquisition strategies to increase the image resolution and sensitivity per unit time
– new magnet technologies for rapid and flexible projection acquisition
– novel analysis strategies to optimize the extraction of information per unit time
– novel resonant structures for enhancement of EPR imaging with continuous wave and pulsed instrumentation
– standards and novel phantoms to test both spatial and physiologic parameter resolution of images

and coordination and the obtaining of animal MRI studies to correlate anatomic images with the physiologic images obtained with EPR.

Qualified applicants must possess:

– A doctorate degree in physics, physical chemistry, or related field
– Expertise in EPR instrumentation and theory
– Expertise in programming and, in particular, in development of acquisition and analysis algorithms
– Expertise in computer control of data acquisition
– The ability to supervise and manage up to ten researchers involved in a wide variety of EPR experiments is crucial
– Willingness to work with animal subjects
– The ability to maintain a calm but critical work environment

Desirable attributes for applicants include:

– Experience with tomographic image acquisition and analysis
– Experience with MatLab programming environment
– Experience with National Instruments Labview
– Experience in the obtaining of MRI images

Applicants should fax (773)702-5940 or e-mail h-halpern@uchicago.edu a letter and Curriculum Vitae to Dr. Halpern, Department of Radiation and Cellular Oncology, The University of Chicago.

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EQUIPMENT

Do You Need Help in Design and Construction of EPR Electronics?

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We also supply a conversion kit to convert Varian field-control units to voltage-controlled scan operation. A 6-digit 1-ppm frequency counter is available in X-, C-, S-, L-band, or MHz versions.

Complete microwave/RF bridges from 150 MHz to L-, S-, or C-band are available from designs previously built and tested at the University of Denver.

Please contact:

Richard W. Quine rquine@du.edu

phone: 1-303-871-2419

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65 GHz components including Gunn oscillators, isolator, wave meter, attenuator, magic tee, phase shifter, amplifier, wave guide.

Please send enquires to:

kreilick@chem.rochester.edu

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We have some excess EPR accessories and supplies that might be of use to other labs. For example, we have a lot of chart paper, pens and ink for order recorders, and some spare parts and accessories such as VT Dewars for older spectrometers. If you need something for an older-style Varian or Bruker spectrometer, ask us – we might be able to help. Most items are available for shipping costs.

Gareth R. Eaton geaton@du.edu

Available: Isotope-Containing Spin Probes

A wide assortment of special ^{15}N- and/or ^{2}H-containing spin probes is available at moderate price.

For a catalog and a price list of available compounds **please contact:** Prof. Igor Grigor'ev grig@nioch.nsc.ru, Institute of Organic Chemistry, Novosibirsk 630090, Russia. In the US **please contact:** Dr. Sergei Dikanov dikanov@uiuc.edu.

For SWAP: Fast Digitizers EG&G 9825-200

We have two EG&G 9825-200 fast digitizers (EG&G instruments is now part of AMETEK Signal Recovery; the 9825 is not a current product). These 8-bit (16-bit sum) digitizers can sample up to 200 MS/s. They have a 2-board PC-AT card format. There is an external preamplifier, and software for a PC. We have replaced the EG&G digitizers with Bruker SpecJet digitizers in our saturation-recovery spectrometers, where we used the 9825 digitizers for several years. They were in good operating order when we removed them from service recently. We would be willing to swap the EG&G digitizers for something more immediately useful to us. When they were new, the list price was ca. $ 10K for each of the two digitizers. If you are interested, please discuss possibilities with us.

Gareth R. Eaton geaton@du.edu

For Sale: Varian Equipment

Resonance Instruments has available:

1. Replacement klystrons for Varian EPR bridges (at reduced prices) and other klystrons.

2. Varian V4500-41A low/high power microwave bridge with new klystron – excellent condition.

For more information on these units **please contact:** Clarence Arnow, President rii1@earthlink.net, phone: 1-847-583-1000, fax: 1-847-583-1021.

For Sale: NMR Magnetometer

Sentec Model 1001, including 3 standard probes covering the range of 1 to 10 kG. In good working order, this 1981 model (uses NIM bin!) includes 7-digit display, 0.01 Gauss resolution, accuracy: 10^{-6} relative, 10^{-5} absolute, has automatic peak search feature, BCD output, etc. Can be bought with or without NIM bin and CRT display. Make an offer!

Please contact: Prof. E. J. Knystautas ejknyst@phy.ulaval.ca, Physics Department, University Laval Quebec City (Quebec), G1K 7P4

phone: 1-418-656-5569

fax: 1-418-656-2040

Available: Used Varian EPR Equipment

1. Varian E-104 EPR spectrometer with vertical style bridge and e-line fieldial.

2. Varian E-9 EPR spectrometer.

Both available with warranty and continued service support.

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phone/fax: 1-920-668-9905

e-mail: janderson36@wi.rr.com

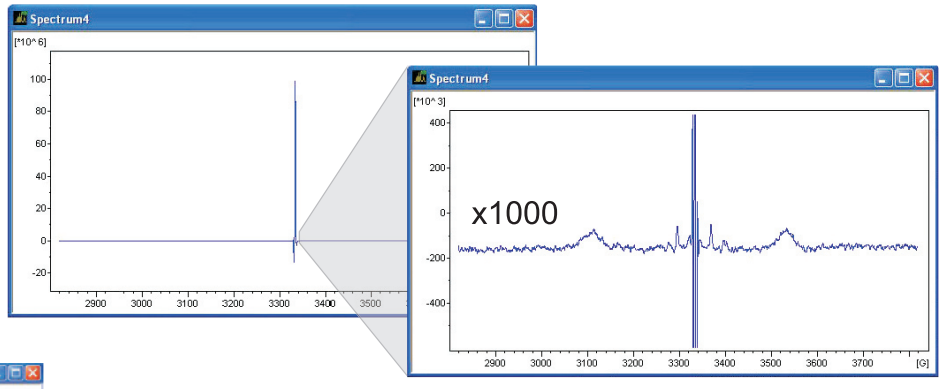
The New Generation EMX plus

The new EMX^{PLUS} houses the latest developments available for CW-EPR spectroscopy

- High Resolution Signal Channel
- High Resolution Field Controller
- Quadrature Detection

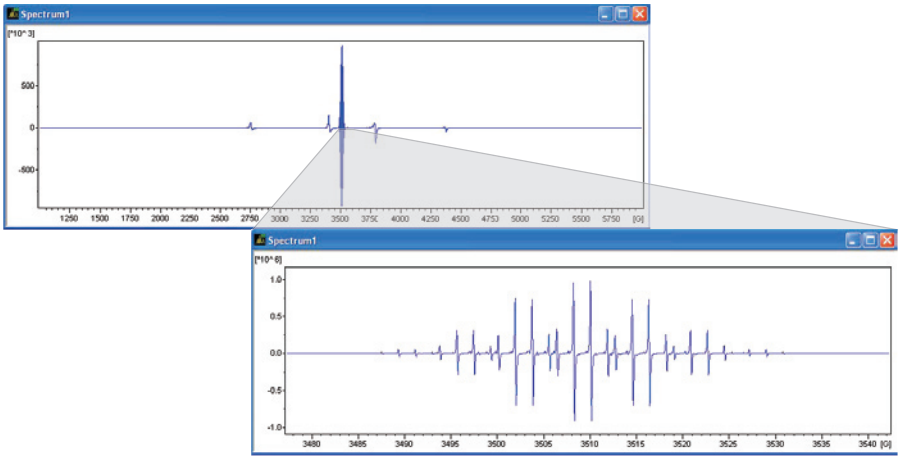
...and optionally

- Integrated Variable Temperature Unit
- Integrated CW-ENDOR
- Teslameter



24-bit Amplitude Resolution

- Sweep Time independent resolution
- Gain optimization no longer critical

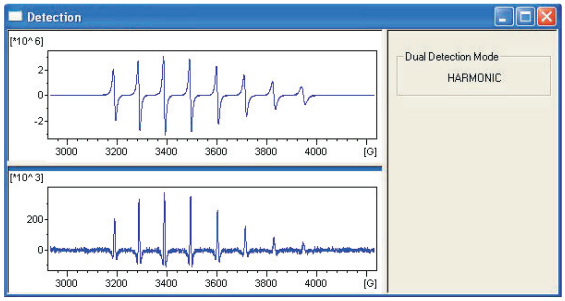


24-bit Field Resolution

- Center field resolution of 1 mG over an 18 kG field range
- Sweep resolution from 2 to 128 000 points over the specified sweep range

Simultaneous Dual Detection

- 1st and 2nd Harmonic
- 0° and 90° Modulation Phase
- Absorption and Dispersion Signals



BRUKER

WIZ EPR

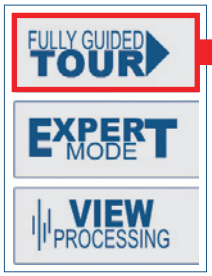
A new way to acquire CW-EPR spectra

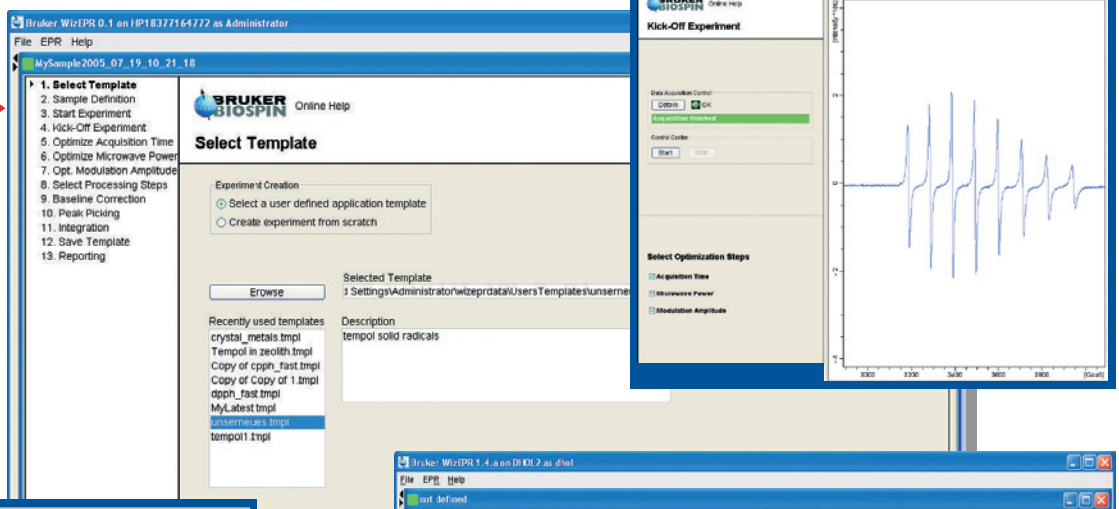
With WizEPR on the EMX^{PLUS}, the task of acquiring an optimized EPR spectrum is as simple as taking a tour.

The fully guided tour assists with optimization of acquisition parameters such as the Sweep Time, Microwave Power, and Modulation Amplitude.

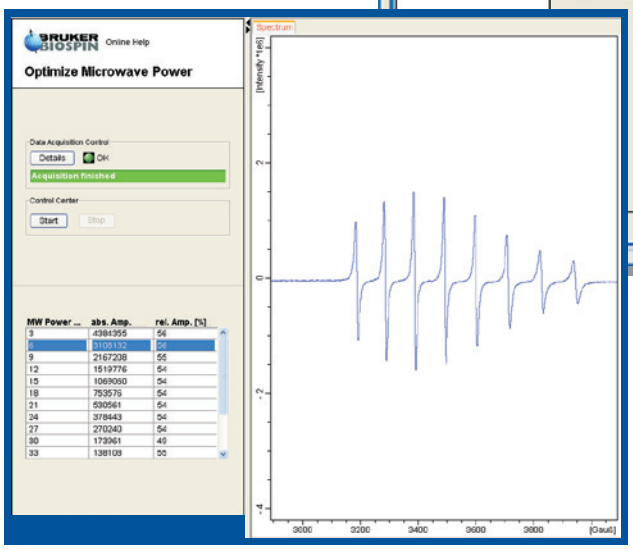
Similarly, a guide through data analysis and reporting will aide in the interpretation of the EPR spectrum.

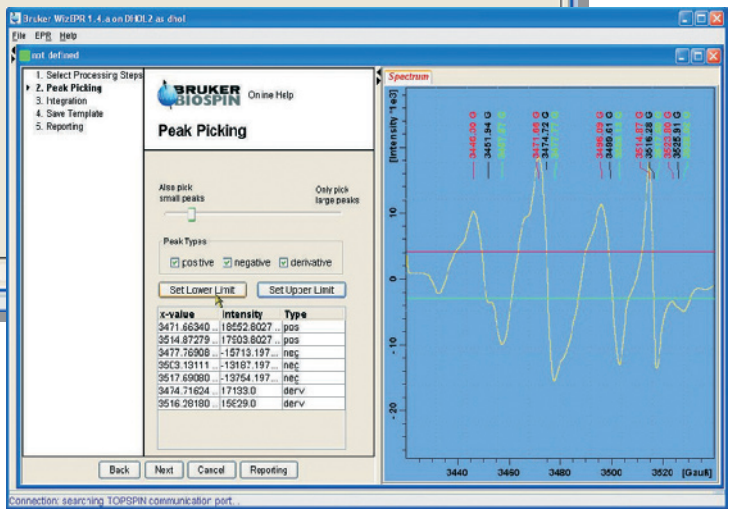
WizEPR conforms to the desired level of expertise, from Beginner to Expert





Optimization routines insure optimal acquisition settings every time





Built-in data analysis and reporting