

epr news letter

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EPR (ESR) Society



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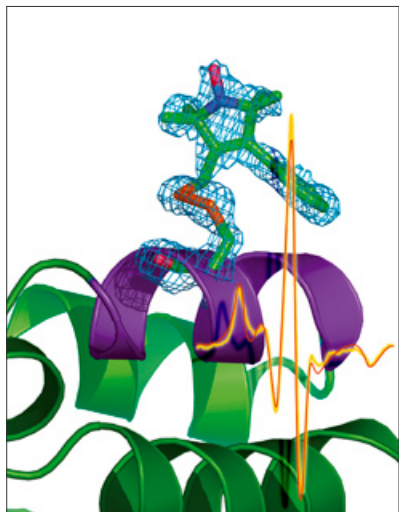
Please feel free to contact us with items (news, notices, technical notes, and comments) or ideas for the *EPR newsletter*.

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The cover picture illustrates an aspect of the research carried out in the group of Wayne L. Hubbell, recipient of the 2003 Zavoisky Award and Bruker Prize for 2004. Shown is a 1.6 Å structural model of T4 Lysozyme (T4L) containing a novel phenyl derivative of a nitroxide side chain. Helices are shown as ribbons (green/violet), the spin label side chain is shown as a stick model, and the electron density is contoured at 1.0 σ (shown in cyan). The corresponding EPR spectrum (shown in yellow, with simulation in red) for this spin labeled T4L mutant identifies an immobilized state of the side chain. The crystal structure reveals the origin of the immobilization as unique internal interactions within the side chain, and interactions with the local environment. Such “internally hindered” side chains are designed to analyze backbone dynamics in proteins (M. R. Fleissner and W. L. Hubbell, unpublished data.)

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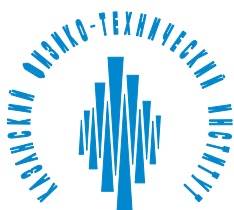
School on Fundamentals and Application of EPR Spectroscopy

The 8th International Symposium on Spin and Magnetic Field Effects in Chemistry and Related Phenomena (SCM2003)

25th Discussion Meeting “25 Years Magnetic Resonance @GDCh”

The Society for Free Radical Biology and Medicine Meeting

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ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

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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:

<http://www.epr-newsletter.ethz.ch/contact.html>

photo of the issue
see page 13



Take our quiz!

Send an e-mail to the editor telling where the village Fullereren can be found together with the names of three neighboring villages. Deadline: May 15, 2004. 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 postage stamp showing an endohedral fullerene where the atom inside becomes visible when warming the stamp (thermochromic ink). The participants of our quiz will be announced in one of the next *EPR newsletter*.

Editorial

Dear Colleagues,

Good news! This is the last issue of volume 13! Devil's dozen! Of course, to be on the safe side, we should have skipped this volume and started with volume 14. However, we just could not yield to being superstitious even if it would have been a reasonable thing to do. Nevertheless, the doom of volume 13 did its dirty deed: as Tony Addison rightly noted, when the printed copy of the newsletter 13/1-2 reached the readers, the "Notices of Meetings" were nearly all for conferences that were already past! We will keep an eye that this mishap does not occur in future issues. In any case, the pdf version of issue 13/1-2 was on the newsletter website www.epr-newsletter.ethz.ch already in August 2003 when "Notices of Meetings" were as fresh as morning dew.

We live in 2004. In many aspects, it has to be a very interesting year: 29 days in February (luckily February 29th was a Sunday so for sure we did not overwork), Olympic Games in Athens, two partial solar eclipses, one on April 19 in South Africa and another one on October 14 in Siberia, Presidential and Parliamentary elections in different countries, the change in the borders of the European Union, and of course not to forget the badminton game on August 12 in the South

Pacific between Cook Island and Marshall Island across the international date line (with interesting time reversal effects). However, for the EPR community the most important date is that 2004 marks the 60th anniversary of EPR. Evgeny K. Zavoisky made this fascinating discovery with a very simple homebuilt setup. Unbelievable! He was only 36 years old then. However, maybe this is exactly the way one makes a discovery; young and burning with desire to wrest the secrets from nature. Zavoisky provided all of us with a powerful tool to study problems in various fields of science and stimulated the creative activity of generations of researchers to come. By the way, the variety of applications of EPR is nicely illustrated in the columns "For Your Perusal" edited by Arthur Schweiger.

Many questions arise when we look back on the years when EPR was still a baby in its cradle. What was it that made our greats what they are? How was it when all of them were young people just starting their road in science? I think it is vital for the younger generation to know about our origins. I am happy that in this issue of the newsletter Harden McConnell shares with us his reminiscences. His thrilling story, "A Love Affair with Spin" in the "EPR newsletter Anecdotes" column, makes us travel in time and dive into streams of controversial theories debated. And it vividly shows how important the discovery of EPR was for the scientific development.

I already used the term “young” two times. To be exact, it is not the age of the body that matters. It is the age of our soul that makes us young at 80 or old at 30. I am pleased to draw your attention to the article of ever young Joan van der Waals, “Venturing by Sailboat into the Heart of Russia”, in the “Another Passion” column. I bet you will be fascinated by his story! The same as I was fascinated in 1999 trying to contact Joan to inform him that he was chosen as the Zavoisky Awardee 1999 and getting the response that it was not possible to immediately relay this information to him because he was sailing on the high seas at the time.

Yes, our greats teach us valuable lessons of being ever young and interested in life and in science.

Good news for the IES members who already enjoy the discount subscription price of the journal *Applied Magnetic Resonance* and a good stimulus to the rest to start their subscription: Al Garroway prepared a double issue “Detection by Magnetic Resonance” of this journal (see column “New Books and Journals”). To quote the guest editor: “The reader will see a similarity of resonance frequencies, power requirements, low-noise and interference requirements, pulse sequence development and practical issues involved in moving a spectrometer from the laboratory out into the field”.

I am grateful to the few who were brave enough to contribute to volume 13. Special thanks go out to Shirley Fairhurst. Frankly, the level of the feedback we have from our

readership could be a bit higher. When I think of this, with my inner eye I see the Coliseum of ancient Rome: populus Romanus Quiritium watching gladiators who fight lions in the arena and putting their thumbs upwards or downwards, leaving the gladiators alive or condemning them to death. This is not the case with the readership of the newsletter and the editorial staff. You are not spectators and we are not performers. You and we are one team. If we succeed, it is the result of our joint efforts. If we fail, it is the result of you being too shy and timid in supplying us with news and us being too shy and timid to wrest the news from you.

I am looking forward to our fruitful collaboration.

Laila Mosina

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E-Mail and Postal Address Policy

The IES holds data on its members and others for the administration of its membership affairs and for distribution of its Newsletter to members and selected non-members. It also distributes a list of members, their interests and e-mail addresses with one issue of the Newsletter each year. This list is distributed to paid-up members only.

Other than to its Officers, or as may be required by law, the IES will not disclose personal data to third parties.

From time to time the IES may distribute, on behalf of third parties, material thought to be of scientific or professional interest. Data subjects' personal information is not disclosed to the third parties concerned. To opt out of receiving mailings from third parties send an email to Chris Felix (cfelix@mcw.edu).

Shirley A. Fairhurst,
Secretary IES

Fellowship of the IES to Harry Kurreck

Prof. Dr. Harry Kurreck (Institut für Organische Chemie, Freie Universität Berlin) is appointed a Fellow of the International EPR (ESR) Society in recognition of his outstanding contributions to EPR and ENDOR spectroscopy on organic radicals, multispin systems and radical pairs, in particular in photosynthetic electron-transfer model systems.

The title of Fellow of the Society is conferred on those who have made truly outstanding contributions to EPR theory and/or practice.

Yu. D. Tsvetkov,
President IES
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Is your company involved in magnetic resonance in any way?

If so, consider advertising in the *EPR newsletter*. Your company will have its own advertising and information box in each issue. It will be seen by a targeted audience of thousands of specially selected scientists worldwide. Information on sponsoring the Society and advertising is shown on this Web site:

http://www.epr-newsletter.ethz.ch/corporate_sponsors.html

The 2003 IES Silver Medal for Biology/Medicine to Michael Davies



Michael Davies earned BSc and PhD degrees in Chemistry from University of York, UK, following which he had a productive post-doctoral fellowship at Brunel University in west London. He returned to York as a University lecturer, then emigrated to Australia at the end of 1995 as an Australian Research Council QE2 fellow and was appointed as Group Leader at the Heart Research Institute, Sydney. Appointed to an Australian Research Council Senior/Professorial Fellowship in 2000, he is currently the Deputy Director of Heart Research Institute.

His primary research interests lie in examining the mechanisms of degradation of biological macromolecules including proteins and DNA, the pathophysiological consequences of these processes, and the develop-

ment of methods to quantify protein damage in vitro and in vivo. Some scientific highlights are: use of EPR spin trapping to trap macromolecule radicals (e.g., DNA, RNA, protein and polysaccharide-derived species); use of enzymatic proteolysis to chop these down to give low-molecular-weight species which give (nearly) isotropic species to enhance EPR identification of radicals; detection of radicals during ischemia-reperfusion injury in isolated hearts; identification of radical adducts formed on DNA bases using spin trapping; radical-mediated fragmentation pathways of peptides and proteins, sugars and polysaccharides; radical transfer pathways between side-chains and backbone in peptides, particularly involving alkoxyl radicals; studies on the formation and reactions of long-lived protein radicals (e.g., on Tyr residues); development and usage of specific side-chain oxidation products to detect protein oxidation in vitro and in vivo.

Michael Davies has published over 180 primary publications, and a number of review articles. He co-authored the first research monograph on protein oxidation "Radical-Mediated Protein Oxidation: from Chemistry to Medicine". He is joint editor of the Royal Society of Chemistry review series "Electron Paramagnetic Resonance" and is on the Editorial Boards of several journals. He is currently President of the Society for Free Radical Research (Australasia).



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.

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Zavoisky Award 2003 to Wayne L. Hubbell

The 2003 Zavoisky Award in Electron Paramagnetic Resonance Spectroscopy was awarded to Professor Wayne L. Hubbell (University of California, Los Angeles) in a ceremony marking his outstanding contribution to the development and applications of the site-directed spin-labeling method.

The ceremony was preceded by the 13th Annual Workshop "Modern Development of Magnetic Resonance", 17–19 September 2003.

In the afternoon of September 17 a reception of Wayne L. Hubbell by the Prime Minister of the Republic of Tatarstan, Rustam Minnikhanov, took place.

The Zavoisky Award was presented on September 19, 2003 in Kazan, the capital city of the Republic of Tatarstan. It was there that academician E. K. Zavoisky discovered EPR in 1944. The Zavoisky Award consists of a Diploma, a Medal and one thousand US dollars.

The Zavoisky Award was established by the Zavoisky Physical-Technical Institute of

the Russian Academy of Sciences with support from the Kazan State University, the Springer-Verlag Publishing House, the Republic of Tatarstan, the Tatarstan Academy of Sciences, the AMPERE Society and the International EPR Society. The Award Selection Committee consisted of well-known experts in EPR: B. Bleaney (Oxford), G. Feher (La Jolla), K. Möbius (Berlin), A. Schweiger (Zurich), Yu. D. Tsvetkov (Novosibirsk), and the Chairman, K. M. Salikhov (Kazan). The selection of the Awardee was made after consultations with the Advisory Award Committee which comprises C. A. Hutchison Jr. (Chicago) and Yu. N. Molin (Novosibirsk).

Previous winners of the Zavoisky Award were: William B. Mims (1991), Brebis Bleaney (1992), Arthur Schweiger (1993), James R. Norris, Yakov S. Lebedev and Klaus Möbius (1994), James S. Hyde (1995), George Feher (1996), Kamil A. Valiev (1997), Jack H. Freed (1998), Joan H. van der Waals (1999), Harden M. McCon-

nell and Bruker Analytik GmbH (2000), Keith A. McLauchlan (2001) and Wolfgang Lubitz (2002).

The selection of Wayne L. Hubbell was made from many nominations solicited from international experts in EPR.

The Award Ceremony starting in the afternoon of September 19 was attended by about 200 people, among them were the scientists who had participated in the preceding Workshop.

The ceremony was chaired by Kev M. Salikhov. He, as the Chairman of the Award Committee, announced the decision of the Zavoisky Award Committee. The presentation was made by the Deputy Prime Minister of the Republic of Tatarstan, Zilya R. Valeeva. The Rector of the Kazan State University, Makzyum Kh. Salakhov, the Chairman of the Presidium of the Kazan Scientific Center of the Russian Academy of Sciences, Aleksandr I. Konovalov, and the Vice-President of the Tatarstan Academy of Sciences, Shamil M. Chabdarov, warmly congratulated the laureate. Letters of congratulations from Hans W. Spiess, President of the AMPERE Society, Yuri D. Tsvetkov, President of the International EPR Society, and Michael Mehring, President of ISMAR, were handed to Wayne L. Hubbell.

W. L. Hubbell gave his Zavoisky Award lecture in which he discussed problems of applications of site-directed spin-labeling for the study of protein structure and dynamics. A concert given by a string quartet preceded and followed the ceremony. The event was concluded with a Banquet in honor of Wayne L. Hubbell and his outstanding contributions to EPR. During their stay in Kazan the laureate and his spouse visited the museum of history of the Kazan State University, the places of historical and cultural interest in Kazan, and the Raifa monastery.

The Organizing Committee owes special thanks to the Ministry of Industry, Science and Technology of the Russian Federation, and the NIOKR Fund of the Republic of Tatarstan.



Wayne Hubbell (right) is handed the Zavoisky Diploma by Zilya Valeeva (center) and Kev Salikhov (left)

Nominations Open for the Zavoisky Award 2004

The Zavoisky Award 2004 will be presented at the 14th Annual Workshop "Modern Development of Magnetic Resonance" (see p. 9) dedicated to the 60th anniversary of the discovery of EPR by E. K. Zavoisky. It will take place in Kazan in the period of 15–20 August 2004.

This prestigious award is given in recognition of an outstanding contribution to the development of electron paramagnetic resonance. It is presented by the Kazan Zavoisky Physical-Technical Institute of the Russian Academy of Sciences, the Kazan State University, the Tatarstan Academy of Sciences, and Springer-Verlag Wien New York. The lecture of the award-winner will be published in the journal *Applied Magnetic Resonance*.

Nominations are being sought from the EPR community worldwide. A brief presentation of the applicant covering 1–2 pages is expected. The final decision is made by the Award Selection Committee which comprises: George Feher (La Jolla), Dante Gatteschi (Florence), Harden M. McConnell (Stanford), Klaus Möbius (Berlin), Arthur Schweiger (Zurich), and the Chairman, Kev M. Salikhov (Kazan). The selection of the Awardee is made after consultations with the Advisory Award Committee which comprises Brebis Bleaney (Oxford), Clyde A. Hutchison Jr. (Chicago), Yuri N. Molin (Novosibirsk), and Yuri D. Tsvetkov (Novosibirsk).

Nominations should be submitted to:

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The deadline for submission
of nominations is April 1, 2004.



Venturing by Sailboat

Joan H.
van der Waals

Like a giant closed up in a cave with only a pinhole of light and air, the great landmass of the Muscovite empire possessed but a single seaport: Archangel, on the White Sea. This unique harbour, remote from the Russian heartland, is only 130 miles south of the Arctic Circle. Six months of the year, it is frozen in ice. Yet, despite its drawbacks, Archangel was Russian. It was the one place in the entire realm where a young man intoxicated by the idea of ships and oceans could actually see great ships and breathe salt air. No tsar had ever been to Archangel, but no tsar had ever been interested in ships.

With these sentences R. K. Massie opens the chapter *Archangel* of his biography of Peter the Great. Russia had been land-locked by the Swedes and Turks for centuries, and Peter grew up in an entourage of inward-looking nobility and xenophobic orthodox clergy. But already as a teenager he broke out of his imperial fetters and indulged in modern "western" techniques which he learnt by mixing (and drinking!) with Dutch and English craftsmen in the "German suburb" outside the Moscow city walls, a kind of ghetto reserved for foreigners. So, at the age of 21 – against the explicit will of his mother but having soothed her by a promise "not to sail on the ocean" – he set out for Archangel in July 1693. A real expedition in those days: some 1000 miles, first by horse-drawn wagons and then by river barges, in a train of more than a hundred people including eight singers and two dwarfs for Peter's entertainment. In Archangel, watching the annual arrival of the fleets of Dutch and English merchantmen seeking Russian furs and caviar, he became even more fascinated by ships, the ocean, and the world beyond. He laid the keel for a small seagoing vessel, the *St. Paul*, and commanded that it be finished during the winter. In the spring of 1694 he returned, knocked away

Another
Passion

the props to launch the St. Paul and helped to have it rigged with masts and sails. Thus the Russian navy was founded. A few weeks later its strength was more than doubled by the arrival of a magnificent 44-cannon frigate that Peter had ordered from the burgomaster of Amsterdam.

Like Tsar Peter I am fascinated by the sea and what lies beyond, in particular by those parts which escaped from an overdose of civilization. Thus, when in 1994 an invitation arrived from the District of Archangel to participate in the tercentenary of the Russian navy, I jumped at the opportunity. The plan was to sail past the North Cape into the White Sea, up the river Dvina to Archangel; from there in a piloted convoy through Russia's inland waterways to St. Petersburg, and thence home by the Baltic Sea. It became a

in a lush environment. Even at midnight a row of sleepy officials happily stamped our documents at record speed. On waking we saw couples sunbathing and a multitude of children climbing "Stalin organs" and other pieces of obsolete artillery lined up along the sunny river-banks for the festivities of the tercentenary. From afar the pleasant waterfront looked much as it must have three centuries ago: the long white façade of the Dutch and English merchant's factory behind which now lies the city's museum, and down-stream the island where Peter lived, Solombala with its quaint wooden houses and tiny potato plots. With the collapse of the Soviet Union the city was desperately seeking to establish ties with the Western world, like in Peter's days, and we were treated accordingly to a splendid week.



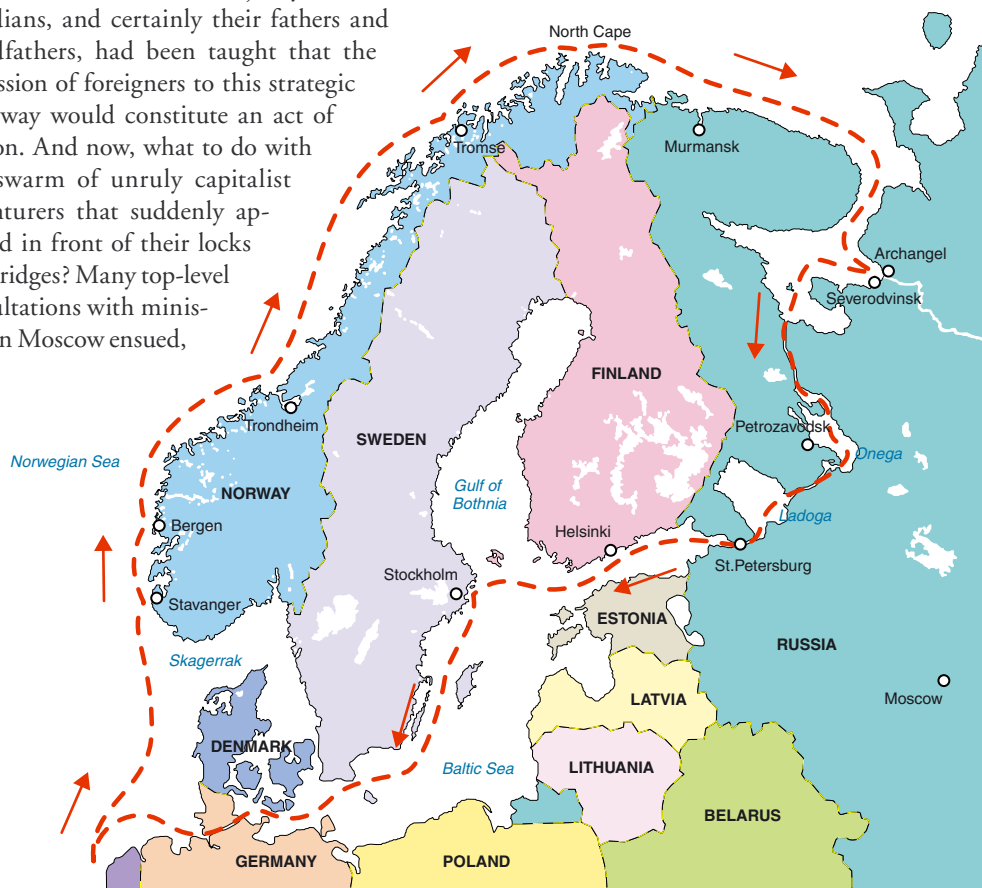
into the Heart of Russia

trip I'll never forget; 3500 nautical miles in a small 30 foot sailboat.

Previously the North Cape had seemed far beyond our reach, but after a magnificent voyage along the islands and mountains fringing the Norwegian coast, we rounded it in surprisingly pleasant weather. Then we stopped in Vardøy – literally "Watch Island" – where we saw the 17th century barracks of Christian the IVth's soldiers, next to the foundations of the German guns that fired at the convoys heading for Murmansk in WW II. Here we stocked up with an ample supply of klippfisk (dried, salted cod), oranges and grapefruits before venturing along the barren coast of the Kola Peninsula into the White Sea. After five days Archangel offered a surprise. In winter, the city is ice-bound and desperately cold. But in summer, when the sun hardly sets, it springs to life

I'll be brief about the return voyage. Our hardships were not those customarily associated with the perils of the sea. But, once outside the realm of the Governor of the District of Archangel, we found ourselves at the mercy of officialdom. Of the guardians of the White Sea-Baltic Sea canal system constructed by Stalin's forced labourers in the nineteen thirties. The majority of these guardians, and certainly their fathers and grandfathers, had been taught that the admission of foreigners to this strategic waterway would constitute an act of treason. And now, what to do with this swarm of unruly capitalist adventurers that suddenly appeared in front of their locks and bridges? Many top-level consultations with ministries in Moscow ensued,

which caused near-endless delays in forced anchorages in the middle of nowhere. But even this cloud had a silver lining: it gave me ample time to translate Goudsmit's delightful account of the history of the discovery of the electron spin by him and Uhlenbeck for *Foundations of Modern EPR*, the book edited by the Eatons and Kev Salikhov. Read it!



much of this controversy, and I sometimes wondered if any of the approximate theories were right. This grim picture was dramatically changed through the discovery of paramagnetic resonance spectroscopy and the subsequent observations of hyperfine and zero-field splittings, particularly in organic free radicals.

I can date my love affair with electron spin rather accurately. Sometime in 1948 when I was a graduate student at the California Institute of Technology, Linus Pauling gave a lecture in which he rather casually mentioned that the electron spins on the carbon atom of methane (CH_4) were correlated. That is, for example, he said that there is a preference for the spin directions to be parallel to one another. This topic was brought up in connection with

aromatic free radicals was reported by Weissman and collaborators in 1953, it was then relatively straightforward for me to show that the isotropic splittings arising from in-plane protons was due to π - σ electron spin exchange on the carbon atoms, an effect related to my early calculations on diatomic molecules. I described my calculations at an international Molecular Quantum Mechanics Conference in Texas in 1955. Here was a method to measure spin distributions in large molecules!

Contemporary scientists may have difficulty appreciating the confusion that reigned during these early years of electronic structure research, and the battles that raged between valence bond theory and molecular orbital theory protagonists. Even worse, one of the serious proposals at this 1955 confer-

A Love Affair with Spin

Harden M. McConnell

I have always been particularly passionate about the field of paramagnetic resonance spectroscopy. This is doubtless related to my personal educational background. I received my undergraduate, graduate and postdoctoral education during a period of time (1944–1952) when the electronic structures of molecules were much discussed and debated, but with little solid evidence to enable one to distinguish between competing theories. Having been both at Cal Tech and Chicago, I witnessed

the valence state of atoms, and their energies as determined from the Birge-Sponer extrapolation. I was intrigued with the idea of spin correlation, and set about making some theoretical calculations of multiplet splittings in simple diatomic molecules such as CH and NH. This was not part of my thesis work, but the effort made a lasting impression since a relatively simple calculation (using Slater atomic integrals) gave useful results.

When the discovery of proton hyperfine splittings in the paramagnetic resonance of

ence was to describe the electronic structure of molecules in terms of orbitals centered on just one atom!

Having lived through this wonderful period of scientific development, I still get a thrill when I see a paramagnetic resonance spectrum! This is because I know that such spectra often provide vital information about molecular electronic structure.

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The International Scientific Forum Dedicated to the 200th Anniversary of the Kazan State University and 60th Anniversary of EPR

Kazan, Russian Federation
August 15–20, 2004

The Forum comprises the following main activities:

- The presentation of the International Zavoisky Award 2004
- The presentation of the Kazan Zavoisky Award for young researchers
- Two parallel conferences (see below)
- A summer school (see below)

The Conference

Nanoscale Properties of Condensed Matter Probed by Resonance Phenomena (NanoRes-2004)

<http://www.mi.ru/~dtayursk>

The focus is on local properties of strongly correlated systems: high-temperature superconductors, magnetoresistive manganites, low-dimensional and layered materials, Jahn-Teller and similar systems probed by NMR, EPR, optics, ARPES and other related methods.

The conference website contains detailed information concerning the conference and pre-registration forms.

The 14th Annual Conference

Modern Development of Magnetic Resonance (EPR₆₀)

<http://www.kfti.knc.ru/EPR60>

The conference covers recent developments and applications of magnetic resonance in various fields of science. Participants of the conference are invited to submit their full original papers to be published in a special issue of the journal *Applied Magnetic Resonance*. The papers should be prepared according to Instructions to Authors (<http://www.springer.at/amr>). The papers will undergo a refereeing procedure. Deadline for submission is 15–20 August, 2004.

The conference website contains detailed information concerning the conference and pre-registration forms.

The VII Summer School for young researchers **Modern Problems of Magnetic Resonance and Its Applications**

M. Tagirov, Rector
murat.tagirov@ksu.ru
V. Zhikharev, Vice-Rector
zhikharev@kstu.ru

Workshop on EPR Studies of Viable Biological Systems, (especially in vivo) and Related Techniques (especially oximetry)

Dartmouth Medical School, Hanover,
New Hampshire, USA
September 19–23, 2004

<http://www.dartmouth.edu/~eprctr/>

The EPR Center for the Study of Viable Biological Systems at Dartmouth Medical School, Hanover, NH, USA (Hal Swartz, P1) is pleased to announce a workshop on In Vivo EPR and related studies. The meeting will be carried out as part of the activities of the EPR Center for Viable Systems at Dartmouth, an NIH supported resource center.

This workshop is scheduled in the interval between the international meetings on In Vivo EPR, the last of which was held in Kyushu in 2003, and the next that will be held at Ohio State in 2005.

The aim of this workshop is to provide a highly interactive and informal setting in which young investigators can interact with established scientists in the field to expand their knowledge and capabilities in the exciting and fast growing area of in vivo EPR, including clinical applications. Laboratory directors are strongly encouraged to nominate appropriate young scientists and students to participate in the meeting, as well as attending themselves. Individuals without direct experience in EPR, but who have interest in potentially using these techniques, also are encouraged to attend.

To facilitate participation of students, young investigators, and scientists who are entering the field, there will be a significant number of free registrations, which will in-

clude the cost of a shared room and most meals. Please contact Dinny Carreiro for information concerning eligibility for assistance.

The meeting will include coverage of the following general topics:

- Instrumental Approaches
 - In Vivo Spectroscopy
 - In Vivo Imaging
 - Overhauser Imaging
 - Pulse Methods
 - Resonators
- In Vivo Oximetry
- In Vivo Measurements of Nitric Oxide
- Use of In Vivo EPR for Pharmacology
- In Vivo Measurements of Reactive Species
- Clinical Applications of EPR
- EPR Studies of Viable Cell Systems

The program will consist of oral and poster presentations, with an emphasis on discussions. Several of the oral presentations will emphasize overviews and will be didactically oriented.

For further information please contact:

Virginia S. (Dinny) Carreiro
dinny.carreiro@dartmouth.edu
Dartmouth Medical School
7785 Vail Room 703
Hanover, NH 03755, USA
phone: 603-650-1784
fax: 603-650-1717

ISMAR 2004

October 24–29, 2004

<http://www.ismar.org/>

(previously announced in *newsletter* vol. 13, nos. 1-2)

The Asia-Pacific EPR/ESR Symposium 2004 (APES'04)

Indian Institute of Science, Bangalore, India
November 22–25, 2004

<http://physics.iisc.ernet.in/~apes04>

and

International School on EPR Spectroscopy and Free Radical Research (ISEPR-APES'04)

Bhabha Atomic Research Center, Mumbai, India
November 17–20, 2004

Following the tradition of previous APE Symposia held in Hong Kong (1997), Hangzhou (1999), and Kobe (2001), APES'04 aims to cover all sub-areas of EPR/ESR.

Contributions dealing with all aspects of recent developments in theory, applications, methodology, instrumentation and experimental techniques related to EPR/ESR, pulsed EPR, high-frequency and high-field EPR, ENDOR, time-resolved EPR, FMR, MRI, CIDEP, and ODMR are invited. In addition to a few plenary lectures there will be four parallel sessions covering the following broad sub-fields:

- Physics and Materials Science
- Biology, Life and Medical Sciences
- Chemistry, Earth and Environmental Sciences
- New Developments and Cross-Disciplinary areas

Each of these will have invited talks, oral, and poster presentations. It is also planned to have a few "topics in focus" sessions such as "EPR in Rare-Earth Manganites" and "Non-Resonant Microwave Absorption Studies in High-Temperature Superconductors" under category "Physics and Materials Science". Suggestions for such "in focus" sessions in other categories are welcome.

It is open to participants not only from countries in the Asia-Pacific region but also from all over the world.

ISEPR-APES'04 will be held as a Satellite meeting prior to the APES'04. The School is aimed to provide a forum for scientists engaged in EPR/ESR spectroscopy for biophysical, chemical, biomedical, and materials science research as well as applications. Several expert faculties will deliver state-of-the-art lectures covering theory, instrumentation and applications of EPR spectroscopy involving free radicals.

Young investigators are especially encouraged to participate in the School as this would enable them to improve their understanding of the basic principles and acquire a broad view of developing applications in multidisciplinary areas of EPR spectroscopy and free radical research including food science and radiation biology. The School is open to participants from all over world and schedules are such that they can attend the School as well as APES'04. Lecture materials are proposed to be published in the form of a book.

A combined First Announcement has recently been distributed electronically. For more information please visit the APES website: <http://www.ied.edu.hk/has/phys/apepr/>

or inquire with the respective Chairman of the LOC:

APES'04

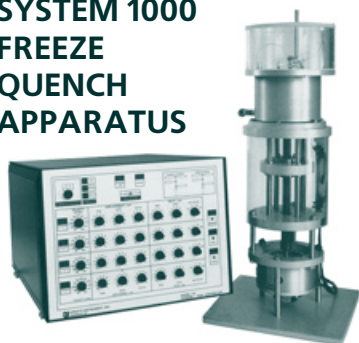
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ISEPR-APES'04

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 The Asia-Pacific EPR/ESR Society

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The First ESR Summer School for Graduate Students *Spin Polarization and Time-Domain ESR*

Sendai, Japan
August 5–7, 2003

The 1st summer school with the main subject “Time-Domain ESR (Time-Resolved ESR)” was attended by 26 graduate students. They came from 16 laboratories all over Japan where different fields of chemistry, physics, and medicine are studied. Four lectures were given: 1. ESR as an electromagnetic wave spectroscopy (Seigo Yamauchi, Tohoku University, Sendai), 2. Radicals and spin polarization (Akio Kawai, Tokyo Institute of Technology, Tokyo), 3. Radical pairs and the time-evolution of the signal (Kiminori Maeda, University of Tsukuba, Tsukuba), and 4. FID and ESE methods (Tadaaki Ikoma, Tohoku University, Sendai). All lectures went on slowly and confidently, providing a unique atmosphere. Although the students could hardly learn too many things, they seemed to be satisfied with the topics they learnt. During the first evening, each graduate student represented his/her research in a 3–5 minute talk and the lecturers represented their research in 30 minute talks. The talks of the lecturers served as advanced courses and were very useful. In the morning of the third day, we arranged a “question time” when each student asked at least one question. This was a kind of a training for self-representation and for confirming the knowledge obtained.

All the participants stayed at the same hotel and lived together for three days. A small and a big party took place at the first and second evening. After this school many new “dimers” and/or “clusters” of friendly relations were formed and the participants of this school have met again at subsequent conferences and meetings having not only discussions but also experiencing pleasures of friendship. Such things are just what we wanted to happen and they were one of the pleasures to organize the summer school.

The 1st summer school for graduate students closed with many jokes. We plan to

hold the 2nd ESR summer school this August again in Sendai, Japan. Please join us again or attend the school as a newcomer.

Seigo Yamauchi, director of the school

■ I became familiar with in vivo ESR owing to four years of studies as a PhD student at the Graduate School of Pharmaceutical Science, Kyushu University. It was also the time when I understood the necessity to study basic ESR, which however, could not be realized easily. At that time, I got an inspiring letter from Prof. Seigo Yamauchi at Tohoku University about the summer school on ESR and have immediately decided to join it.

The location of the school was surrounded by beautiful nature, meaning that we were enclosed and could not escape from the lectures. The subject of the school was “Time-Domain ESR”. As I usually dealt with cw ESR, I thought of time-domain ESR as pulsed ESR including free induction decays and/or spin echoes just like in NMR. However, the first teacher explained that it is mostly cw ESR, though we also had a lecture on pulsed ESR. He also described that the signal can be detected on the nanosecond time scale. I wondered whether the time resolution should be limited to 10 μ s, if we apply a field modulation of 100 kHz. The teacher answered that they do not use field modulation in time-resolved cw ESR. I wondered whether the sensitivity was high enough to detect short-lived radicals. The answer was that the populations in the spin sublevels do not obey the Boltzmann distribution but are caused by chemically induced dynamic electron spin polarization (CIDEP). As a result, not only absorption but also “emission” of microwave radiation is observed in these ESR experiments. This ESR world was completely different from my previous knowledge. How narrow was my understanding of ESR until now!

Consequently, the experience of this summer school shattered my tiny self-confidence in ESR and refreshed my interest to work in this field of research. Being devoted to your study is great, but it sometimes narrows the range of thinking. I hope that this school will be the place where many young scientists in various ESR fields meet and develop their ideas. I am grateful to Seigo Yamauchi, the school president, and to the three teachers, Akio Kawai, Kiminori Maeda, and Tadaaki Ikoma, for giving me the opportunity to join the school. I am also looking

forward to attending the 2nd ESR summer school this year.

Shingo Matsumoto, student

School on Fundamentals and Applications of EPR Spectroscopy

Urbino, Italy
September 18–25, 2003

A school on *Fondamenti ed applicazioni della spettroscopia EPR* (Fundamentals and Applications of EPR Spectroscopy) has been held in Italy, hosted by the Urbino University, in September 18–25, 2003, organized by the Italian ESR group GIRSE. The organizing person was Francesca Ottaviani (Urbino), and the scientific committee was chaired by the GIRSE President Marina Brustolon (Padova). The scientific committee was composed by A. Alberti (Bologna), V. Barone (Napoli), C. Corvaja (Padova), E. Giamello (Torino), M. Lucarini (Bologna), C. Oliva (Milano), G. F. Pedulli (Bologna), A. Ponti (Milano), M. Romanelli (Firenze), U. Segre (Modena), and P. Stipa (Ancona). Forty students attended the school. The program comprised 35 lectures on the basics of spectroscopy, instrumentation and spectral analysis in liquid and solid samples, as well as various applications of EPR to biology, chemistry and physics. The files of the lectures (in part in Italian) will be assembled on a CD. IES members can ask for a copy (contact [Marina Brustolon](#)).

Marina Brustolon

The 8th International Symposium on Spin and Magnetic Field Effects in Chemistry and Related Phenomena (SCM2003)

University of North Carolina, Chapel Hill, USA
September 21–26, 2003

I have successively attended all the spin chemistry meetings since I participated in the 5th meeting held in Jerusalem (Israel) in 1997. I was so pleased to be aware of my friendship with many people in this community. Although the present meeting was actually not so big concerning its scale, I found many interesting presentations on a wide

variety of spin-related science in the fields of chemistry, materials science and biology. So many animated discussions were made in both oral and poster presentations.

One of the most impressive presentations was a hot topic, namely, magnetoreceptor orientation and navigation by the earth magnetic field used by animals. K. J. Lohmann (University of North Carolina) focused on the effect of weak magnetic fields on the behavior of sea turtles and discussed possible mechanisms of the magnetoreceptors. He suggested that different animals may rely on different mechanisms, which have however not yet been identified in any animal. P. J. Hore (Oxford University) presented a stochastic-Liouville equation approach to explore the "avian photomagnetoreceptor sensitivity" by a flavin-tryptophan radical pair for sensing the strength and direction of the earth magnetic field. Anisotropic hyperfine coupling of the nitrogen nuclei was proposed to play a key role for magnetic field sensing resulting from the radical pair mechanism.

So many things about electromagnetic effects on the behavior of animals and human beings are still unresolved! As presented by C. R. Timmel (Oxford University), experimental approaches, such as low-field reaction-yield-detected magnetic resonance spectroscopy, also become important in solving problems on magnetoreceptors and on adverse health effects of the electromagnetic field.

I was also strongly interested in recent developments in constructing molecular wires and nanoscale devices. M. R. Wasielewski (Northwestern University) discussed long-range features of the electron tunneling matrix element for the donor-bridge-acceptor electron transfers at distances of several nanometers. The exponential distance dependences of the tunneling matrix element were estimated by directly detecting the exchange interactions of the photoinduced charge-sep-

arated radical pairs using the magnetic field effects that influence the charge recombination reactions. A. I. Smirnov (North Carolina State University) presented a novel lipid nanotube array for hybrid nanoscale devices. They succeeded in building and characterizing patterned arrays of phospholipids self-assembled inside nanopores in anodic aluminum oxide membranes. W-band EPR spectra of spin-labeled nanotubes clearly confirmed these structures. Moreover, he showed that lipid nanotubes are suitable for supporting membrane-associated proteins, demonstrating their advantages for the application in nanoscale devices and in biochips.

As a conference chair, Malcolm D. E. Forbes did great efforts for organizing the meeting, including a fantastic banquet with dancing and featuring music.

The next SCM will be organized by Prof. P. J. Hore and held at Oxford (UK) in 2005.

Yasuhiro Kobori

Griesinger, Göttingen, on protein dynamics measured by residual dipolar couplings and Thomas Szyperski, Buffalo, on G-matrix FT-NMR. From the field of EPR spectroscopy highlights were the talk of Kerstin Jacobsen, Berlin, on structure and dynamics of proteins on planar surfaces (who also won the price for the best conference poster) and the talk of Gunnar Jeschke, Mainz, on (besides other topics) the first PELDOR results of a 3-spin-label system in a membrane protein complex. Bernhard Blümich gave a public evening talk about imaging application in soft-material science, and H. Günther gave the conference dinner speech about the history of the German Magnetic Resonance Group and its constitution as a section in the Gesellschaft Deutscher Chemiker (GDCh). Two poster sessions with 130 posters allowed the participants to get a good overview on the nowadays activities of the German Magnetic Resonance research groups.

Thomas Prisner

25th Discussion Meeting 25 Years Magnetic Resonance @GDCh

Gesellschaft Deutscher Chemiker, Fachgruppe
Magnetische Resonanzspektroskopie, Leipzig, Germany
September 29 – October 2, 2003

Conference Chairman: Stefan Berger, Leipzig

The German Magnetic Resonance Spectroscopy Group celebrated its 25th anniversary in 2003 in Leipzig. In two days 32 lectures were given covering high-resolution NMR, solid-state NMR, imaging and EPR. Of the 18 invited lecturers six were from outside Germany and four were EPR spectroscopists. There were two sessions on EPR: one on biological applications and methods and another on applications in materials sciences. Very nice talks were presented by Lucio Frydman, Rehovot, on multidimensional NMR spectroscopy with a single scan, Christian

The Society for Free Radical Biology and Medicine Meeting

Seattle, USA
November 20–24, 2003

The Society for Free Radical Biology and Medicine (SFRBM) is the new name for a much older organization which some readers may have come across – it used to be called the "Oxygen Society", but with the rapid change and expansion, in the interests of the members of this group, a change to a more all-encompassing name was thought to be appropriate, and this change over occurred in early 2003. This Society, and its precursor, are the American affiliate of the global International Society for Free Radical Research which oversees the activities of a number of regional groupings including those from Europe, Asia, Australasia and Africa.

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The birthplace of one of the exciting fields of EPR research

The biennial meetings organized by both the International body (2004 in Buenos Aires, 2006 in Davos, Switzerland), and the annual meetings organized by the SFRBM, have become key meetings for those interested in the role of free radicals, and a wide range of other oxidants, in medicine, biology, physiology, biochemistry and chemistry (and all areas in between). As might be imagined the meetings are very varied in subject matter and are an important forum for the exchange of ideas between these disparate fields. Over recent years the SFRBM meeting has gone from strength to strength with over 700 people attending the Seattle meeting from virtually all corners of the globe. The meeting format has been relatively constant for a number of years with a range of plenary lectures, "Sunrise Free Radical School" lectures (a highly regarded teaching-style series of lectures which preface each day and lay the groundwork for later sessions in the day), multiple parallel sessions on specialized topic areas, technical workshops, intensive poster sessions and the infamous "hospitality suite" where much of the informal, and most important, conference business is conducted over a few (or more) complimentary glasses of wine or beer late into the evening.

Though the meeting may not initially seem to be of main-stream interest to EPR spectroscopists, there has always been a significant number of EPR studies presented at these meetings, as this technique remains the "gold-standard" for the detection and identi-

fication of radicals in biological systems. For those who are interested in, or who are looking for, applications for the technique, this is certainly a key meeting, as there are always many people interested in carrying out collaborative studies to detect the elusive free radicals implicated in the many important biological and medical pathologies which have been linked with oxidative stress (e.g. heart disease, many cancers, inflammation, radiation damage, arthritis, to name but a few). Furthermore these meetings always benefit from the presence of people with a sound background in the chemical and physical sciences to keep the wilder flights of imagination of some of the medical community firmly grounded in reality. Overall they are always exhausting, but highly fruitful meetings, in terms of meeting new people, exchanging ideas with both old friends and new acquaintances, and hearing from leading experts in this major growth area of scientific endeavor. Further details, and abstracts from all the talks and posters from the latest meeting, can be found in a supplement to the journal "Free Radical Biology and Medicine" (2003, vol. 35, Supplement 1) published by Elsevier.

The next meeting will be held in somewhat warmer, and hopefully drier, climes than Seattle, with the 11th annual meeting scheduled for the Marriott Beach Resort, St. Thomas, Virgin Islands in the Caribbean from the 17th till 21st November 2004. Further details can be found on the SFRBM

website (www.sfrbm.org). Hopefully I'll see some more of our readers there!

Michael Davies

6th International Symposium on ESR Dosimetry and Applications

Campos do Jordão, São Paulo, Brazil
October 12–16, 2003

Campos do Jordão is a mountain city, about two hours drive from São Paulo. The meeting was attended by about 65 people, all of whom stayed at the same hotel, which provided many opportunities for valuable discussions. The meeting began with a Sunday evening workshop by Gareth Eaton entitled "Introduction to ESR Fundamentals". Dieter Regulla gave a keynote lecture "ESR Spectrometry – A Future-Oriented Tool for Dosimetry and Dating". The invited lectures include discussions of electron spin relaxation times and their impact on dosimetry, radiation dosimetry using signals in teeth, the use of EPR in monitoring the effects of the Chernobyl accident, alanine dosimetry for interlaboratory comparisons, ESR dating and human evolution in Europe, new dosimetric materials, dosimetry in the clinic, and EPR instrumentation for dosimetry. A lively poster session added to the opportunities for technical interactions.

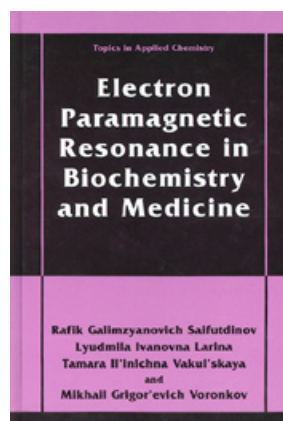
Sandra Eaton

In this column, new books, journals and reviews on EPR, or literature closely related to EPR, are presented and briefly reviewed. The column covers material published starting from 2000 up to date; completeness is not claimed.

BOOKS

Electron Paramagnetic Resonance in Biochemistry and Medicine

R. G. Safjutdinov, L. I. Larina,
T. I. Vakul'skaya, and M. G. Voronkov
Price: \$ 89.50 (Hardcover), \$ 134 (eBook*)
Publication date: January, 2001
Publisher: Kluwer Academic/Plenum Publishers
284 pages, ISBN 0-306-46531-0/ISBN 0-306-46925-1



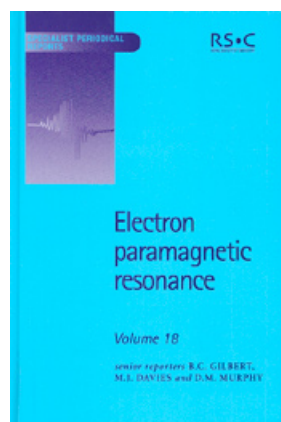
This book makes the reader to become aware of the astonishing variety of paramagnetic species present in virtually all parts of the human body. The monograph gives a very extended overview of EPR experiments done on paramagnetic centers in human biological media, as well as in organisms of volunteers and patients in various pathological states. The book is recommended to graduate students in medicine and biology, but in view of the bibliography with more than 700 citations it also represents a very valuable reference work for experts in the field.

From the book description: This comprehensive book discusses spectra of many tissues and bodily fluids, and the quantitative nature of paramagnetic centers in both normal individuals and patients suffering from a variety of diseases. Special attention is given to the EPR examination of biomolecules, such as

enzymes, polypeptides, vitamins, lipids, hydrocarbons, etc., which play an essential role in human activity. This book will be of great interest to physicians specializing in many different areas. Similarly, biologists, biochemists, biophysicists, and chemists will find this book very useful.

Electron Paramagnetic Resonance: Volume 18

Series: *Specialist Periodical Reports*
Senior Reporters: B. C. Gilbert,
M. J. Davies, and D. M. Murphy
Price: £ 259.50 (Hardcover)
Publication date: December, 2002
Publisher: The Royal Society of Chemistry
372 pages, ISBN 0-85404-315-2



In volume 18 of the series *Electron Paramagnetic Resonance* again the literature in different fields of EPR is critically reviewed and commented. The ten chapters mainly concentrate on applications of EPR, instrumentation and methodology is only covered in some length in the contribution about EPR imaging. Note that individual chapters from volumes published 1998 onwards are now also available online, fully searchable by key word, on a pay-to-view basis.

From the book description: Volume 18 of *Electron Paramagnetic Resonance* highlights major developments in this area reported up to the end of 2001, with results being set into the context of earlier work and presented as a set of critical yet coherent overviews. The

topics covered describe contrasting types of application, ranging from biological areas such as EPR studies of free-radical reactions in biology and medically-related systems, to experimental developments and applications involving EPR imaging, the use of very high fields, and time-resolved methods. Critical and up-to-the-minute reviews of advances involving the design of spin-traps, advances in spin-labelling, paramagnetic centres on solid surfaces, exchange-coupled oligomers, metalloproteins and radicals in flavoenzymes are also included.

Contents:

Free Radicals in Biomolecular Injury and Disease *by M. J. Burkitt*
Recent Developments in EPR Spin-Trapping *by M. J. Davies*
Time-Resolved EPR Studies of Transient Organic Radicals *by D. Beckert*
Spin-Labeling in High-Field EPR *by A. I. Smirnov*
Techniques and Applications of EPR Imaging *by D. J. Lurie*
EPR of Exchange-Coupled Oligomers *by D. Collison and E. J. L. McInnes*
EPR of Paramagnetic Centres on Solid Surfaces *by D. M. Murphy and E. Giamello*
EPR of Radical Intermediates in Flavoenzymes *by C. W. M. Kay and S. Weber*
Progress in High-Field EPR *by P. C. Riedel and G. M. Smith*
Iron Coordination in Metalloproteins: Structural and Electronic Aspects *by J. Hüttermann and R. Kappl*

NEW JOURNALS

Concepts in Magnetic Resonance Part B: Magnetic Resonance Engineering

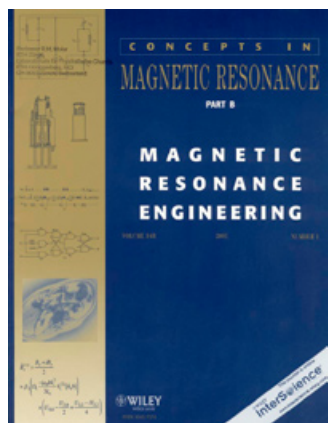
(existing since 2002)

Editor-in-chief: Daniel D. Traficante

Concepts in Magnetic Resonance was founded in 1989 by Daniel D. Traficante and Robert L. Lichter. The message this journal should bring to the reader was originally expressed

* eBook: 'electronic book', digital version of the print book.

by the subtitle “An Educational Quarterly” which has later been changed to “Bridging Education and Research”. In 2002 *Concepts in Magnetic Resonance* was divided in two parts. While Part A continues to bridge education and research, Part B with the subtitle *Magnetic Resonance Engineering* is considered as a forum where engineering and instrumental aspects can be discussed.



From the letter of the editor in the first issue:

“Dear Reader, *Magnetic Resonance Engineering* is an international journal devoted to the publication of original investigations concerned with the hardware and software of the engineering and physics aspects of magnetic resonance instrumentation. The need for a journal of this type stems from the fact that a large amount of important engineering research is being presented at meetings and not being published in journals. Many journals tend to consider such work unacceptable – it is typically perceived to be an unnecessary detail, and even engineering terminology is often unacceptable to their referees. This journal is unique in the sense that it consolidates such articles, making them easily available to the community. It provides a cohesive focus for all those engaged in magnetic resonance engineering, and provides them with a proper forum for publishing their work. Research articles in all areas of engineering, including hardware and related software, are considered appropriate for this journal. Some examples are the design of spectrometers and their components, including magnets, gradients, probes, coils, transceivers, and sample changers, and the software that is directly pertinent to those areas. To summarize, researchers and developers of magnetic resonance hardware and its concomitant software need a journal of their own, one that is peer reviewed by others in the same community.” – *Daniel D. Traficante*

REVIEWS

EPR Methods

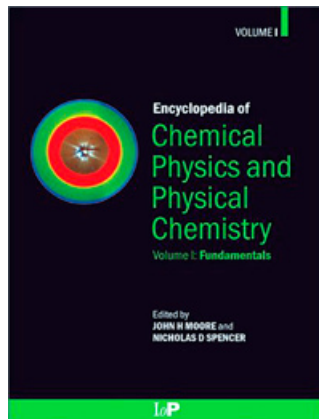
S. Weber, p. 1351–1388

in: Encyclopedia of Chemical Physics and Physical Chemistry, John Moore and Nicholas Spencer (Editors-in-chief)

Price: \$ 750 (Hardcover)

Publication date: October, 2001

Publisher: Institute of Physics Publishing
3 Volumes, over 3000 pages, ISBN 0750303131



This Encyclopedia with 127 contributions and more than 1100 illustrations is an indispensable handbook for physical chemists. Volume II contains descriptions of most of the methods used for the characterization of materials, including a chapter on EPR written by Stefan Weber. This review can highly be recommended as an introductory text to EPR spectroscopy, which makes the reader acquainted with the basics of EPR, and with instrumentation aspects, multiple resonance techniques, and pulse EPR.

Synopsis: The *Encyclopedia of Physical Chemistry and Chemical Physics* is a major new reference work that any chemist and physicist can turn to for an introduction to an unfamiliar area, an explanation of important experimental and computational techniques, and a description of modern endeavors.

Contents:

Volume I: Fundamentals

Microscopies, thermodynamics and statistical mechanics, dynamical processes

Volume II: Methods

Determining materials and molecular properties, dynamic measurements, techniques for applying theory

Volume III: Application

Microscopic systems, extended and macroscopic systems, chemical kinetics and dynamics

Magnetic resonance techniques

A. Brückner, M. Che, K. Dyrek, D. Goldfarb, P. J. Grobet, R. A. Schoonheydt, and B. M. Weckhuysen, p. 25–153

in: Spectroscopy of Transition Metal Ions on Surfaces, B. M. Weckhuysen, P. Van Der Voort, and G. Catana (Editors)

Price: Euro 49.50

Publication date: 2000

Publisher: Leuven University Press
308 pages, ISBN 90-5867-025-2

Surface science has become a hot topic. In particular in heterogeneous catalysis there is a need to characterize the structure of the surface on a molecular level by spectroscopic means. This book describes different technique such as magnetic resonance, vibrational, electronic, and X-ray photoelectron spectroscopy. In chapter 2.1–2.4 of this monograph an excellent introduction is given to cw and pulse EPR, and the application of these techniques in studies of transition metal ions on surfaces are presented.

From the preface: *Spectroscopy of Transition Metal Ions on Surfaces* serves as an introduction to some of the most important spectroscopic techniques nowadays used for studying the chemistry and catalytic properties of transition metal ions on surfaces. The basic principles and the strengths and weaknesses of continuous wave electron spin resonance, pulsed electron spin resonance, solid state nuclear magnetic resonance, infrared spectroscopy, Raman spectroscopy, diffuse reflectance spectroscopy and X-ray photoelectron spectroscopy are critically reviewed by internationally recognized experts. In addition, the use of *in situ* techniques and chemometrical techniques has been included because of its growing importance in catalyst characterization.

Electron Paramagnetic Resonance of Metalloproteins

Graham Palmer, p. 121–185

ESEEM and ENDOR Spectroscopy

N. Dennis Chasteen and Penny A. Snetsinger, p. 187–231

in: Physical Methods in Bioinorganic Chemistry: Spectroscopy and Magnetism, Lawrence Que, Jr. (Editor)

Price: \$ 83 (Hardcover)

Publication date: March, 2000

Publisher: University Science Books
556 pages, ISBN 1-891389-02-5

This book can highly be recommended to everyone working on the characterization of bioinorganic compounds. It contains two chapters devoted to electron paramagnetic resonance. In the chapter "Electron Paramagnetic Resonance of Metalloproteins", Graham Palmer reviews EPR spectroscopy of biomolecules containing transition metal ions, and in the chapter "ESEEM and ENDOR spectroscopy", Dennis Chasteen and Penny Snetsinger briefly review the basics of the nuclear modulation effect and of ENDOR spectroscopy.

From the editorial review: This text provides detailed coverage of physical methods used in bioinorganic chemistry. Individual chapters are devoted to electronic absorption spectroscopy, resonance Raman spectroscopy, electron paramagnetic resonance spectroscopy, ENDOR and ESEEM, magnetic circular dichroism, Mössbauer spectroscopy, magnetism, NMR spectroscopy as applied to

paramagnetic systems, and X-ray absorption spectroscopy. The book aims to provide a fundamental understanding of each method and demonstrate how data obtained from a system of bioinorganic interest can be interpreted. Case studies are presented in the last chapter in which more than one technique has been applied to gain insight into each given bioinorganic problem.

Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, vol. 58, no. 6, 1099–1344 (April 2002)

This special issue of *Spectrochimica Acta Part A* contains 23 papers with contributions presented at the EMARDIS 2001 workshop. The studies cover a wide range of applications of EPR and nicely represent the multidisciplinary of this spectroscopy tool.

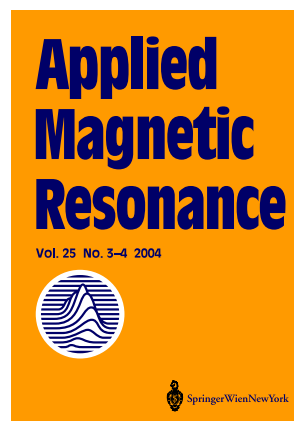
From the preface: "This volume contains the full text of most of the main lectures as well as

a very small selection of the original communications presented at the Seventh International Workshop on 'Electron Magnetic Resonance of Disordered Systems' (EMARDIS), 9–18 June 2001, Sofia-Boyana, Bulgaria. It was our first meeting of the 21st century and hopefully marks the present state as well as the successful new beginning of Electron Magnetic Resonance (EMR) in the world. As the structure of EMARDIS meeting consists of two consecutive sections – Fundamental and Applied – the presented papers cover a wide area of EMR. Up to now, the unique advantages of EMR – its very high sensitivity and extreme selectivity – have not been properly exploited, but there are signs that this period is over. Thus, the content of this special issue is expected to stimulate future studies in some new challenging areas of science and towards practical applications of EMR." – *Nicola D. Yordanov, guest editor*



Detection by Magnetic Resonance

A special issue of *Applied Magnetic Resonance*
edited by Allen N. Garroway



The rubric "Detection by Magnetic Resonance" is meant to convey the notion that there is some known substance to be detected, as opposed to a detailed study. For example, in civil aviation security applications the time allotted to scan a passenger's suitcase for explosives is only of the order of

10 s. As is suggested by the very low Larmor frequencies, and is made even more evident in many of the papers, the signal-to-noise ratio is typically low in these applications, and it is essentially the integrated area of the resonance line that is obtained and compared to some threshold: if the signal exceeds the threshold, an alarm is turned on. But the water prospecting and oil well logging methods take this detection a step further, and ask how deep is the water or what is the nature of the fluid in the borehole, not just a simple "detection" process. I have gathered papers from rather disparate fields because I believe that many of the problems encountered and the many clever solutions achieved are of interest to others outside the narrow specialty. The reader will see a similarity of resonance frequencies, power requirements, low-noise and interference restrictions, pulse sequence development and practical issues involved in moving a spectrometer from the laboratory out into the field. These papers include some reviews of early work that has not been widely publicized, and very recent work involving decidedly practical applications as well as more fundamental papers that provide a theoretical basis for better understanding and improving the detection methodology. I trust that such a collection will be of benefit not only to our fellow authors but to many others working in these very interesting and demanding applications:

NQR for Explosives Detection

- Hudson A., Chongpison A., Loganathan D., Kury J.: The Quadrupole Resonance Properties of Nondetonable Explosive Formulations for Land Mine Detection Machine Calibration and Testing
Suits B.H.: The Noise Immunity of Gradiometer Coils for ^{14}N NQR Land Mine Detection: Practical Limitations
Buess M.L., Caulder S.M.: Factors Affecting the NQR Line Width in Nitramine Explosives
Robert H., Prado P.J.: Threat Localization in QR Explosive Detection Systems
Barras J., Gaskell M.J., Hunt N., Jenkinson R.I., Mann K.R., Pedder D.A.G., Shilstone G.N., Smith J.A.S.: Detection of Ammonium Nitrate inside Vehicles by Nuclear Quadrupole Resonance
Jenkinson R.I., Bradley J.M., Shilstone G.N.: Nuclear Quadrupole Resonance of Explosives: Simultaneous Detection of RDX and PETN in Semtex
Mikhailtsevitch V.T., Rudakov T.N., Flexman J.H., Hayes P.A., Chisholm W.P.: Multipulse Sequences for Explosives Detection by NQR under Conditions of Magnetoacoustic and Piezoelectric Ringing
Rudakov T.N., Mikhailtsevitch V.T., Flexman J.H., Hayes P.A., Chisholm W.P.: Modified Multipulse Technique for the Effective Detection of Pure Nuclear Quadrupole Resonance
Miller J.B., Garroway A.N.: Applications of Adiabatic Half Passage to NQR
Sauer K.L., Klug C.A., Miller J.B., Garroway A.N.: Using Quaternions To Design Composite Pulses for Spin-1 NQR
Rudakov T.N., Hayes P.A., Mikhailtsevitch V.T., Chisholm W.P.: Methods for Optimizing the Detection of HMX by Nuclear Quadrupole Resonance
Osokin D.Ya., Khushnutdinov R.R., Shagalov V.A.: Two-Frequency Multiple-Pulse Sequences in Nitrogen-14 NQR
Blinic R., Apih T., Seliger J.: Nuclear Quadrupole Double Resonance Techniques for the Detection of Explosives and Drugs

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NMR for Explosives and Drug Detection

King J.D., De Los Santos A.: Development and Evaluation of Magnetic Resonance Technologies, Particularly NMR, for Detection of Explosives

Magnuson E.E., Burnett L.J.: Screening System for Detection of Contraband Swallowed Narcotics

Newman D.E., Barrall G.A.: Detection of Contraband in Pelvic Body Cavities

Kumar S.: Liquid-Contents Verification for Explosives, Other Hazards, and Contraband by Magnetic Resonance

NMR for Water Prospecting

Shushakov O.A., Fomenko V.M.: Surface-NMR Relaxation and Echo of Aquifers in Geomagnetic Field
Fukushima E., Kaiser W.: Surface Coil Depth Measurement from Steady-State Free Induction Decays of Partially Relaxed Spins

Legchenko A.: Magnetic Resonance Sounding: Enhanced Modeling of a Phase Shift

NMR for Well Logging

Prammer M.G.: NMR in Well Logging and Hydrocarbon Exploration

Hürlimann M.D.: Diffusion-Relaxation Distribution Functions of Miscible Fluids Measured in Grossly Inhomogeneous Fields

It is interesting to observe the long induction period (30–50 years) from the initial idea to commercialization of a practical instrument. Work on these projects involves a long-term intellectual and financial commitment in our community. Most of this work started from someone's "crazy idea" and I am convinced that there are other meritorious crazy ideas

out there that deserve to be explored. Some of these may change the world.

A copy of this double issue (*Applied Magnetic Resonance* vol. 25, nr. 3–4) costs EUR 332.- (excl. VAT and carriage charges). The issue can also be obtained as part of a subscription to the volumes of 2003, 24 and 25, which is offered at a special rate of EUR 146.- (excl. VAT and carriage charges) to members of the IES ordering directly from Springer-Verlag in Vienna, Austria.

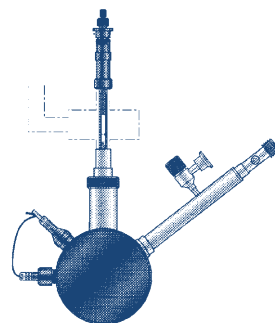
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PRINCETON UNIVERSITY DISTINGUISHED POSTDOCTORAL FELLOWSHIPS IN EPR SPECTROSCOPY

HFSP, NIH and the Dreyfus Foundation are funding a pair of research projects at [Princeton University](#), which supports the application of EPR spectroscopy to understanding fundamental questions in biological chemistry and [materials science](#). Applications for a postdoctoral position are invited for an **EPR spectroscopist** with experience in pulsed EPR methods and data analysis. This person will join a [team](#) of biochemists and materials chemists in the [Chemistry Department](#) under the supervision of [Charles Dismukes](#).

Projects:

- Distance Measurements in Proteins using ELDOR and Double Quantum Coherence ESR. This project aims to advance knowledge of the structure of biomolecules where XRD is not available. Applications to multi-subunit proteins, photosynthetic reaction centers and other biological materials.
- The Structure and Function of Enzymes and Inorganic Materials using Electron Nuclear Double Resonance (ENDOR) and 2D-Hyperfine Sublevel Correlation Spectroscopy (HYSCORE). To determine the electronic and magnetic environments surrounding the nuclei in coordination complexes and enzymes which determine their catalytic properties.
- Functional Dynamics of Proteins and Materials by Time Resolved FT-ESR. To

study transient structural changes in photochemistry of photosynthetic reaction centers and inorganic materials related to catalysis and solar energy conversion and internal dynamics with proteins.

The postdoctoral fellow will have access to two [Bruker EPR spectrometers](#) (EleXsys 585 FT-EPR/ENDOR; ESP-300 series; ENDOR and TRIPLE accessories; fitted with Oxford helium cryostats) and major research resources in the Princeton Materials Institute and the Department of Chemistry. PhD applicants are invited with training in physics or chemistry. Send your CV, list of publications and names and contact information for three referees who have first hand knowledge of your work to:

Ms. Lynn Mendenko
mendenko@princeton.edu
 Princeton University,
 Hoyt Laboratory,
 Department of Chemistry
 Princeton, NJ 08544, USA

A further description of the criteria for selection, benefits, and the project can be found at:

<http://www.princeton.edu/siteware/administration.shtml>

Research Group links:

[Professor G. C. Dismukes](#)
<http://www.princeton.edu/~catalase/>

POSTDOCTORAL POSITION: PULSED EPR OF METALLOPROTEINS AT THE UNIVERSITY OF ILLINOIS

An NIH-funded postdoctoral position is available in the Illinois EPR Research Center at the University of Illinois (Urbana, USA) for research work in pulsed EPR and ENDOR spectroscopy of metalloproteins. There is a focus on ESEEM theory and on

structure-function relationships in Rieske and related proteins.

Expected education: PhD or equivalent in a discipline such as chemistry, biochemistry, molecular and cellular biology, physics, or biophysics. Background should include (1) experimental and/or theoretical magnetic resonance (preferably pulsed) and/or (2) experience with protein preparations and analysis.

Interested individuals should contact Prof. R. L. Belford (rbelford@uiuc.edu). The successful candidate will report directly to Dr. S. I. Dikanov (dikanov@uiuc.edu) and may collaborate with other faculty groups. Salary will be comparable to the usual NIH post-doctoral scale. The University of Illinois is an equal-opportunity employer.

Please contact:

Prof. R. Linn Belford
 Illinois EPR Research Center,
 Department of Chemistry,
 University of Illinois
 Box 18-6 CLSL, 600 S. Mathews
 Urbana, IL 61801 USA
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 fax: 217-244-3186

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Please contact:

William A. Bernhard
william_bernhard@urmc.rochester.edu
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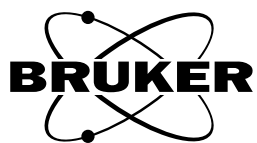
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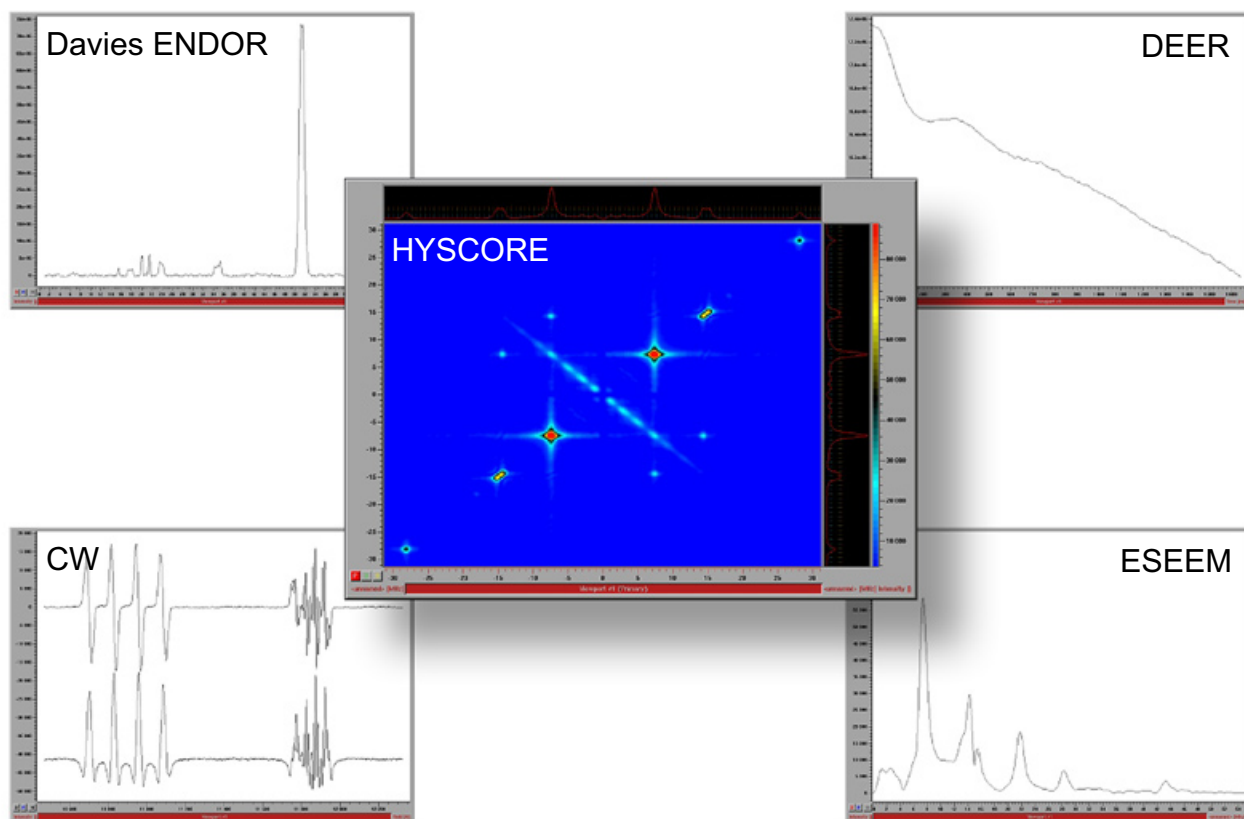
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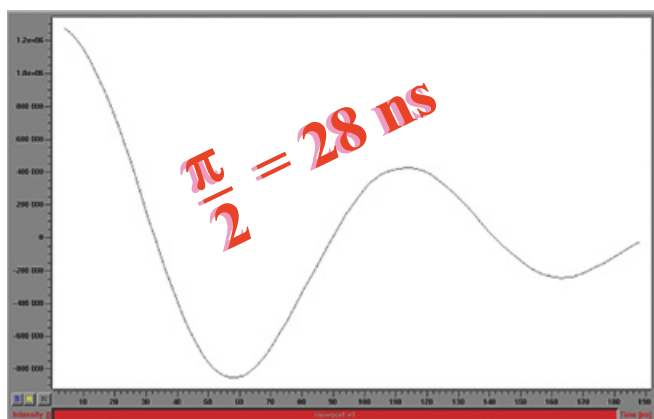
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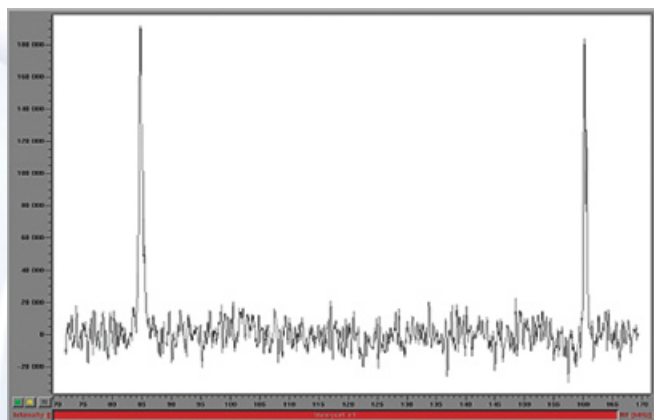
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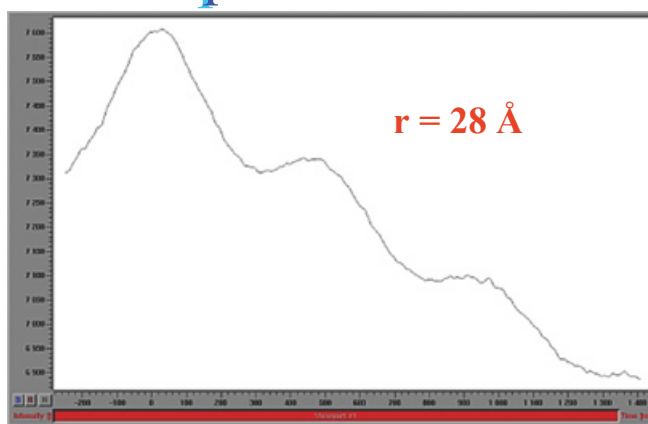
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