

Support of Macedonian Scientific Community via DAAD and ALEXANDER von HUMBOLDT

...A Short Story of Macedonian Way to Science...

Rubin Gulaboski

Goce Delcev University Stip, Macedonia

DAAD

Deutscher Akademischer Austausch Dienst



www.daad.de

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gram
cene.



400-200 0 200 400 600 800
Potential mV

**(Almost 😊) the same Lab....
where we started our road to science
at the Institute of Chemistry in
Skopje...we deal with
ELECTROCHEMISTRY**



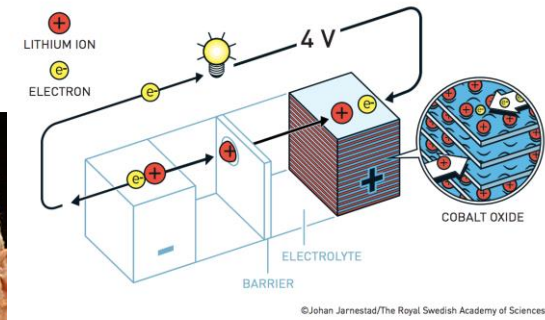
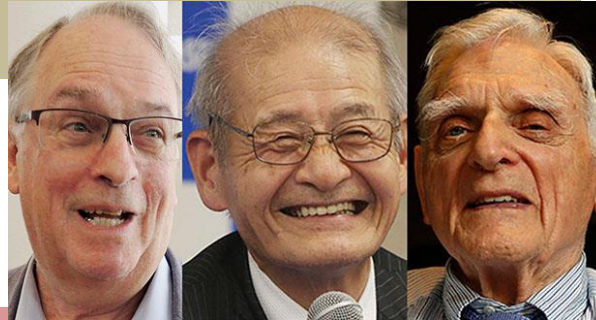


**The GOOD OLDY...PAR 384B
...our first Potentiostat...
...using the highly TOXIC
Mercury as working electrode**

**---but...Harsh conditions in
Macedonia for doing
Science in the end od 20th century**



From 1997 to 2000 we published about 10 research works in highly respected Journals with Impact Factor...
We worked mainly on developing theories of electron transfer reactions under different conditions...
relevant to describe important chemical features of many drugs and enzymes......and confirming the theoretical results by experiments with some chemicals that we occasionally found in the Lab...



©Johan Jarnestad/The Royal Swedish Academy of Sciences

In that time, for us, MONEY WAS NOT A PROBLEM AT ALL...

...because we had NO SINGLE \$ as a support for our work...

...so, we had to do something to continue to develop our research....

Eventually, Valentin contacted Milivoj and Shebojka Lovric Rudjer Boskovic, Zagreb---our first and most influential collaborators



Prof Fritz Scholz



Box 1. IUPAC or US convention?

Two conventions are commonly used to report CV data: the US convention, used herein, and the IUPAC convention. Visually, data reported in the two conventions will appear to be rotated by 180°.

US Convention	IUPAC Convention



**In the Autumn of 2000 we both applied for Scholarships...
...Prof Mirceski applied for Alexander von Humboldt
postdoctoral Fellowship...(about 500 each year for all
disciplines all over the world!)**

...and I APPLIED for a PhD Scholarship in DAAD

-Tough Selection Process:

Motivation Letter

CV

Recommendations

Project Plan for the research activities

Scientific Background

Published papers

Letter of Acceptance of the host

INTERVIEW

...and we both made it!!!

DAAD

Deutscher Akademischer Austausch Dienst
German Academic Exchange Service



Funded in 1925, but closed afterwards and re-established in 1950

In 2018-over 130 000 students and researchers supported via DAAD

Annually more than 50 000 Scholarships for students to make science and research in Germany

Annual Budget of over **550 million euros**

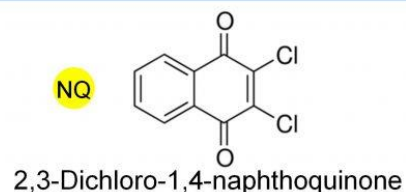
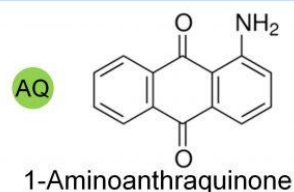
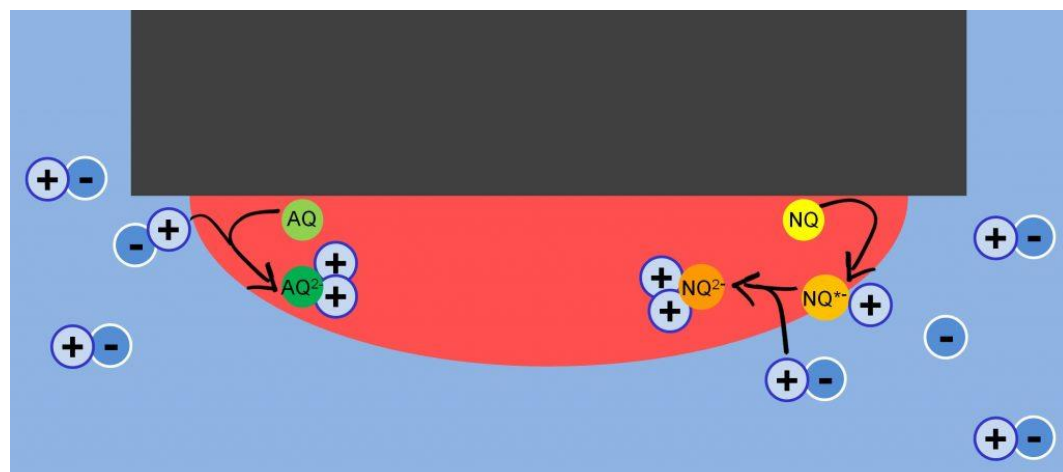
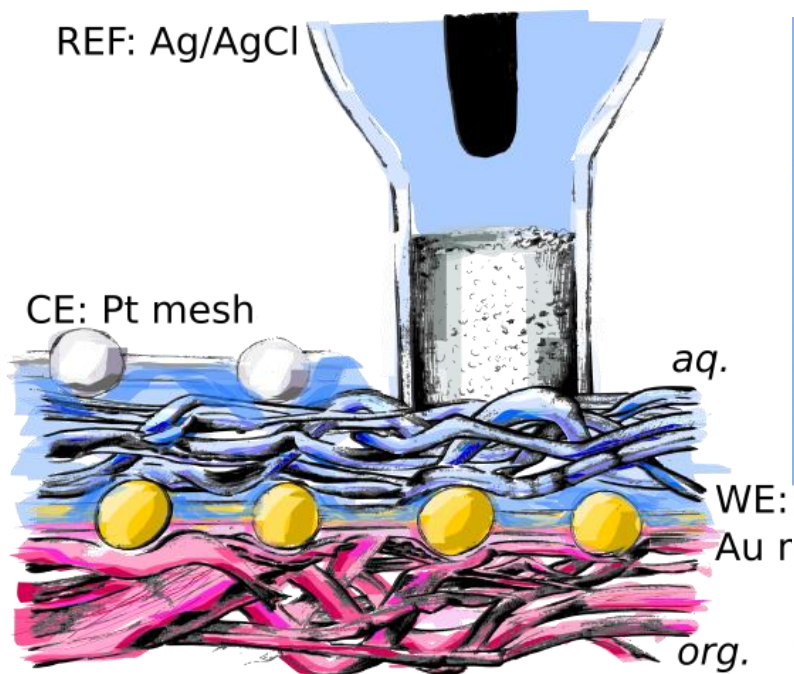
DAAD offers:

- PhD Scholarships
- Master
- Language Courses
- Research
- Short Stays
- Projects
-Awards

PhD Scholarship of DAAD-First Macedonian ---GREIFSWALD---Prof Fritz Scholz



**We started from October 2001 ...and to June 2004...,
we made tremendous progress in a field unknown for us in
...Transfer of Ions across Biomimetic membranes
...linked to the efficiency in acting of many drugs**



**In a period of three years we published about 20 papers
and two monographs...**


**.....I was supported by DAAD and
Prof Mirceski was supported by Humboldt foundation**

I was supported by DAAD from August 2001 to July 31st 2004

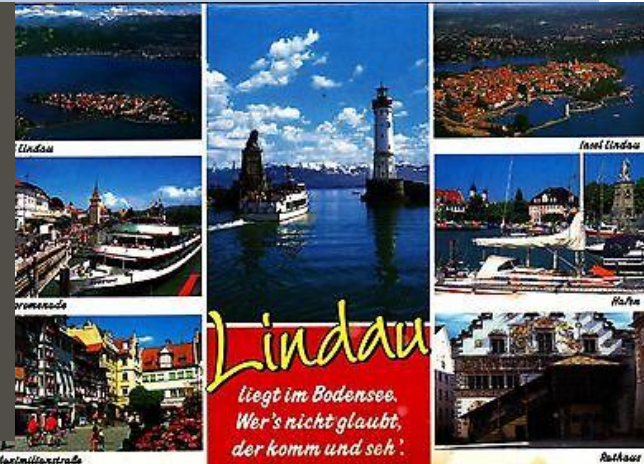
- Scholarship of about 1000 euros per month**
- Health Insurance via DAAD**
- Allowances for travelling home once a year**
- Subsidies for the spouse and children**
- Language course for me**
- Language course for the family...**
- Subsidies for taking part at scientific conferences**
- Annual meetings**
- Subsidies for printing the PhD thesis**
-Social events...**

I got my PhD in June 2004 in Greifswald....

Meeting the Nobel Prize Laureates in LINDAU am Bodensee 1st-5th July 2002



52nd Lindau Nobel Laureate Meeting
2002
Chemistry



Lindau
liegt im Bodensee.
Wer's nicht glaubt,
der komm und seh'!



“Lindau is bridging cultures and initiates relationships among the world’s brightest young scientists.”

Brian Schmidt, Nobel Laureate in Physics 2011



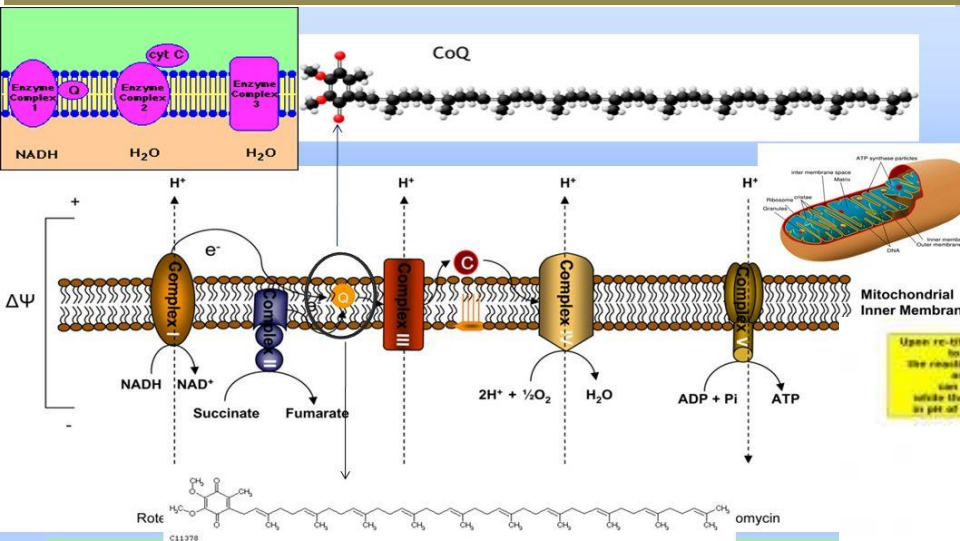
**Shortly afterwards I moved to University of Porto,
Portugal,
....my first postdoc until February 2008**



In 2007 I applied for an Alexander von Humboldt postdoctoral fellowship and I got it..
I moved to Faculty of Medicine, Saarland University in HOMBURG (GERMANY) from march 2008-sept 2009



WE DISCOVERED NEW FUNCTIONS OF COENZYME Q-Highly Important Components



EXPERIMENTS with Coenzyme Q10-CoQ10

EXPERIMENTS with Coenzyme Q10-CoQ10

Relative CoQ10 is absolutely insoluble in water, but...

it can be dissolved in NaOH...and

it can be transformed into a new form in presence of OH⁻ anions present in the organic phase

Upon re-titration from alkaline to neutral pH, the reaction between CoQ10 and OH⁻ ions can be quantified, while the colour of solution in pH of 7.50 remains RED

100µmol/L CoQ10 in pH 7.50
Blank Curve (cyclic voltammetry)
100µmol/L CoQ10 in pH 7.50
100µmol/L CoQ10 in pH 7.50
100µmol/L CoQ10 in pH 7.50
100µmol/L CoQ10 in pH 7.50

Coenzyme Q10 is a redox mediator in the mitochondrial electron transfer chain (METC)



EU-Patent---Benzoquinone Based Antioxidants

Journal of the American Chemical Society

Articles

Calcium Binding and Transport by Coenzyme Q

Ivan Bogeski, Ruben Gulaboski, Reinhard Kappl, Valentin Mirzicki, Stephanie Sadl, Bastian Paszke, Holak H. Hoser, Marina Stefova, Jasmina Petruska Stanoeva, Sasa Mitev, Markus Hoff, and Rainhard Kappl

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*These authors contributed equally to this work.

SCIENTIFIC REPORTS

Hydroxylated derivatives of dimethoxy-1,4-benzoquinone as redox switchable earth-alkaline metal ligands and radical scavengers

Rubin Gulaboski^{1,2*}, Ivan Bogeski^{1,2*}, Valentin Mirzicki¹, Stephanie Sadl¹, Bastian Paszke¹, Holak H. Hoser¹, Marina Stefova¹, Jasmina Petruska Stanoeva¹, Sasa Mitev¹, Markus Hoff¹ & Rainhard Kappl¹

¹Department of Biophysics, School of Medicine, Saarland University, 66421 Homburg, Germany, ²Institute of Chemistry, Faculty of Natural Sciences and Mathematics, "SS Cyril and Methodius" University, Skopje, Republic of Macedonia, ³Faculty of Agriculture, Faculty of Natural Sciences and Mathematics, "St. Cyril and Methodius" University, RMK, Gnjazica, Macedonia

Benzoquinones (BQ) have important functions in many biological processes. In alkaline environments can be hydroxylated at equatorial ester positions. Very little is known about the chemical reaction leading to these structural transformations as well as about the properties of the obtained hydroxyl benzoquinones. We analyzed the behavior of the naturally occurring 2,6-dimethoxy-1,4-benzoquinone under alkaline conditions and show that upon substitution of methoxy groups, poly-hydroxylated (OH)BQs are formed. The emerging compounds with one or several hydroxyl substituents as single or quinone rings exist in oxidized or reduced states and are very stable under physiological conditions compared with the parent BQs. (OH)BQs are stronger radical scavengers and redox switchable earth-alkaline metal ligands. Considering that hydroxylated quinones appear as biogenic, intense or as products of enzymatic reactions, and that BQs present in food or administered as drugs can be hydroxylated by enzymatic pathways, highlights their potential importance in biological systems.

Quinones constitute a broad class of biologically active substances (small molecules) involved in cellular processes such as respiration and photosynthesis¹⁻³. In addition, there is also an increasing number of quinone compounds produced mainly by plants and fungi, for which anticancer antibiotic features have been described⁴⁻⁶. In the respiratory chain, the prime role of coenzyme Q (CoQ) is to transfer electrons from various redox centers and to translocate protons across the inner mitochondrial membrane by turnover of the quinone-oxidized (Q) and reduced (QH₂) redox couple. Because of these redox transitions, CoQ is a weak radical scavenger⁷ and also a source of superoxide (O₂⁻) and related ROS. For quinones in general, the structure of the quinone core group and its substituents determines their activity and chemistry which in case of the biologically and pharmacologically important benzoquinones are not fully resolved. While the mechanism pathway of electron transfer of quinones in organic (aprotic) solvents has been extensively studied and accepted, its aqueous solution chemistry is still controversial⁸⁻¹¹.

It is also known that quinones readily undergo addition/substitution reactions and are structurally transformed by interacting with lipids and enzymes¹²⁻¹⁴. Recently, we have studied coenzymes Q (CoQ) and Q10 which p to be chemically reactive undergoing nucleophilic substitution reactions, although their quinoid ring is substituted with two methoxy groups, one methyl, and an isoprenyl group. In particular, the methoxy part were found to be susceptible to substitution by hydroxide anions¹⁵. In the present study, we focus on a p substituted benzoquinone also containing two methoxy groups, i.e. 2,6-dimethoxy-1,4-benzoquinone (DMBQ) model for other naturally occurring benzoquinones and more complex coenzymes. The physico-chemical effects of methoxy- and dimethoxy-benzoquinones, which are found in many living organisms¹⁶ and are everyday diet (for example BQ in wheat germ)¹⁷, are strongly altered by enzymatic or chemically in substitution or addition of hydroxyl groups¹⁸. Because such hydroxylation reactions are essential steps

Zalando, КОИПЗС ЗА ДОО, Home - УД Интрг, E-Билтени, Корпоративна ба, benzoquinone bas, EP2332898A1

https://patents.google.com/patent/EP2332898A1/en

Google Patents

Benzoquinone-based antioxidants

Images (19)

Classifications

A61Q19/08 Anti-aging preparations

View 3 more classifications

EP2332898A1 European Patent Office

Download PDF Find Prior Art Similar

Other languages: German, English, French

Inventor: Rubin Gulaboski, Ivan Bogeski, Reinhard Kappl, Markus Prof. Hoff

Current Assignee: Universitaet des Saarlandes DE

Worldwide applications

2009 - EP

Application EP09178735A events

2009-12-10 Application filed by Universitaet des Saarlandes

Hydroxylated derivatives of dimethoxy 1,4-benzoquinone as redox switchable earth-alkaline metal ligands and radical scavengers

Meeting the German President in 2008-Berlin



I was supported by Humboldt from March 2009 to Sept 2009

- Scholarship of about 2600 euros per month**
- Health Insurance**
- Allowances for travelling home once a year**
- Subsidies for the spouse and children**
- Language course for me and the family...**
- Subsidies for taking part at scientific conferences**
- Annual meetings**
- Social events...**
-RETURN FELLOWSHIP in Macedonia for one year**
-DONATION IN INSTRUMENTATION in Macedonia**

What we achieved, what we got and what was our Impact to the others in last 18 years?

Two Alexander von Humboldt projects of about 120 000 euros... about 15 Posts for Young collaborators, and instrumentation

One MEGA-BIG project of DAAD---instrumentation, EXCHANGES and scholarships for about 150 students...1 million euros, 12 years

Collaboration with more of 100 scientists from over 30 universities

Return fellowships from A von Humboldt upon return-1 year

INSTRUMENTATION and literature from Alexander von Humboldt, worth about 30 000Eu each

Subsidies to attend and ORGANIZATION of conferences and subsidies to visit our hosts for 2months each year...

Over 200 students directly or indirectly (via our links) are now in Germany, Spain, Portugal, Italy, USA as PhD, Post. Doc, professors

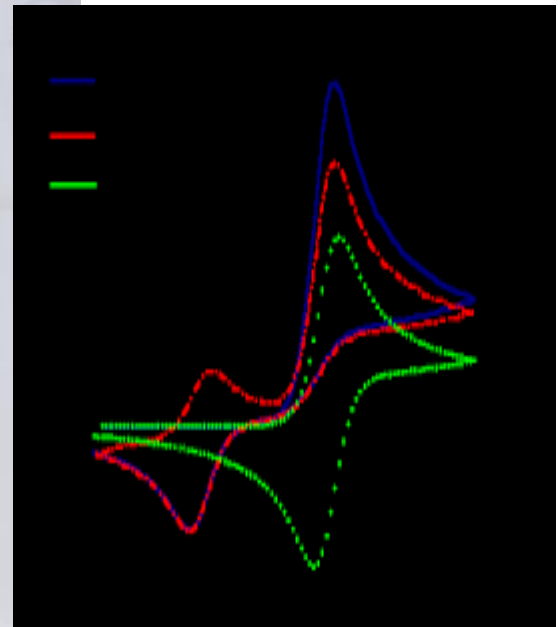
**Hundreds of scientific works, books, patents...
....5 more Humboldtians**

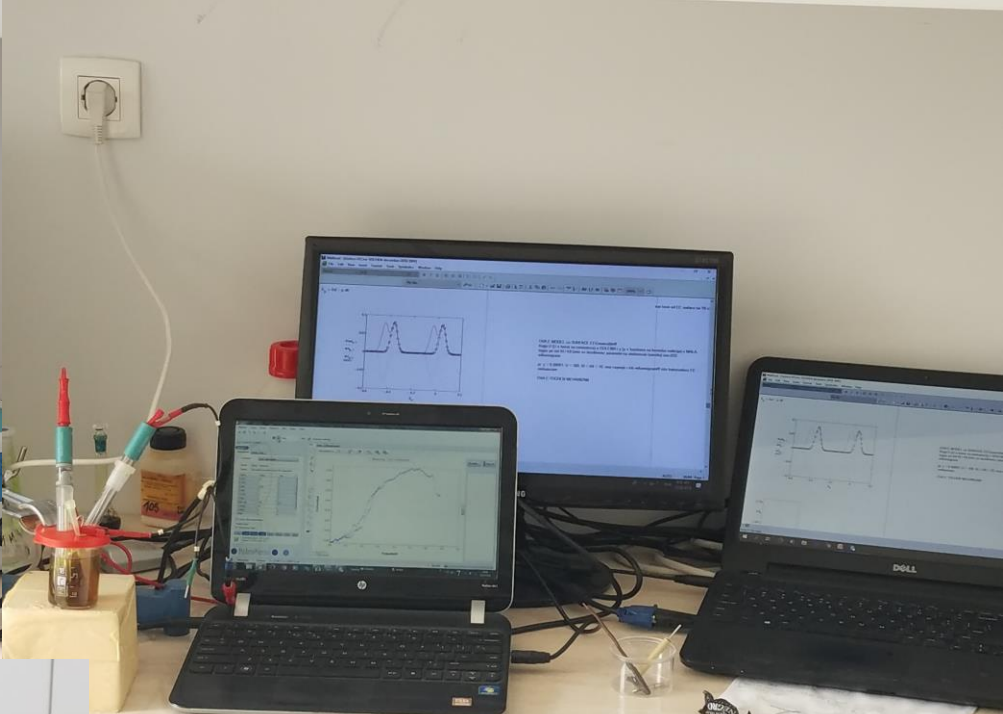
WHERE DID WE START FROM...WHERE ARE WE NOW?

We started working in Chemical Laboratory similar to this one....



and now...thanks
to A von Humboldt





-FOUR Humboldtians from Institute of Chemistry SKOPJE....Five from the same Faculty



**FOUR People from this INSTITUTE OF CHEMISTRY
got the Alexander von Humboldt Scholarship/Award**



Протест на вработените и студентите на Институтот за хемија: Итно да се одобрат вработувања на млади соработници

22.10.2019 Категорија: Образование



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Аплицирај

ПОПУЛАРНО

БИБИ, БОБИ И МЕЈОТ

180 денари




СКАЗИМЕ НА БИБИ, БОБИ И ЗМЕЈОТ

Во продажба сите книжарници низ Македонија



Стопанска комора на Македонија
Ваш бизнис партнер во светот на бизнисот



Академиците објавиле 107 научни трудови годинава, од нив 41 се со импакт-фактор

Меѓународното признание „Блаже Конески“ им беше доделено на Марија Солецка, Марија Бежановска и Борислав Павловски, кои се заслужни за промоција на македонскиот јазик и литература во Полска, Франција и Хрватска.

Напишано од МИА - 09/10/2019 14:06

439

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ВОЗВРАТИ СИЛНО!

- МУЛТИДИСЦИПЛИНАРЕН ПРИСТАП
- БРЗА ДИЈАГНОЗА
- ПРЕЦИЗНА И ЕФИКАСНА ЗРАЧНА ТЕРАПИЈА
- СОВРЕМЕНА ХЕМО И БИОЛОШКА ТЕРАПИЈА
- ВРВНА ТЕХНОЛОГИЈА

ЦЕНТАР ЗА ОНКОЛОГИЈА

From July 1st 2018 to October 31st 2019.

... so, *in a period slightly longer than a YEAR...*

prof MIRCESKI and prof GULABOSKI,

followed by couple of youngsters

PUBLISHED 22 PAPERS in

JOURNALS WITH IMPACT FACTOR

(total IF of > 60 in this period),

...but, WITH ZERO \$ SUPPORT of State MKD!!!!

Conclusion: THE LESS MONEY WE GET
for SCIENCE,

THE MORE SCIENTIFIC ACTIVITY WE HAVE!!!

Articles of MIRCESKI-GULABOSKI et al.. July 1st 2018-Oct 31st 2019

1. Theoretical Contribution Towards Understanding Specific Behaviour of “Simple” Protein-film Reactions in Square-wave Voltammetry R **Gulaboski**
Electroanalysis 31 (**2019**), 545-553
2. Time-Independent Methodology to Access Michaelis-Menten Constant by Exploring Electrochemical-Catalytic Mechanism in Protein-Film Cyclic Staircase Voltammetry R **Gulaboski**, P Kokoskarova, S Petkovska, Croatica Chemica Acta 91 (**2018**), 1-6
3. New Aspects of Protein-film Voltammetry of Redox Enzymes Coupled to Follow-up Reversible Chemical Reaction in Square-wave Voltammetry, R **Gulaboski**, M Janeva, V Maksimova, Electroanalysis 31 (**2019**), 946-956
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Analytical and Bioanalytical Electrochemistry 10 (**2019**), 566-575
5. Protein-film Voltammetry of Two-step Electrode Enzymatic Reactions Coupled with an Irreversible Chemical Reaction of a Final Product-a Theoretical Study in Square-wave Voltammetry, P Kokoskarova, V Maksimova, M Janeva, R **Gulaboski**, Electroanalysis 31 (**2019**) 1-14
6. Square-wave protein-film voltammetry: new insights in the enzymatic electrode processes coupled with chemical reactions, R **Gulaboski**, V Mirceski, M Lovric
Journal of Solid State Electrochemistry 23 (**2019**), 2493-2506
7. Theoretical Aspects of a Surface Electrode Reaction Coupled with Preceding and Regenerative Chemical Steps: Square-wave Voltammetry of a Surface CEC’Mechanism, P Kokoskarova, R **Gulaboski**, Electroanalysis 31 (**2019**) 17-34

8. Square-wave Voltammetry of Two-step Surface Electrode Mechanisms Coupled with Chemical Reactions—A Theoretical Overview, M Janeva, P Kokoskarova, V Maksimova, **R Gulaboski**, Electroanalysis 31 (2019) 50-67

9. Quantification of Hydrogen Peroxide by Electrochemical Methods and Electron Spin Resonance Spectroscopy R Gulaboski, V **Mirčeski**, R Kappl, M Hoth, M Bozem Journal of The Electrochemical Society 166 (2019), G82-G101

10 .Effect of bioactive compounds on antiradical and antimicrobial activity of extracts and cold-pressed edible oils from nutty fruits from Macedonia, Sanja Kostadinović Veličkowska, **Rubin Gulaboski**, Bertrand Matthäus, et al Journal of Food Measurement and Characterization 12 (2018), 2545-2552

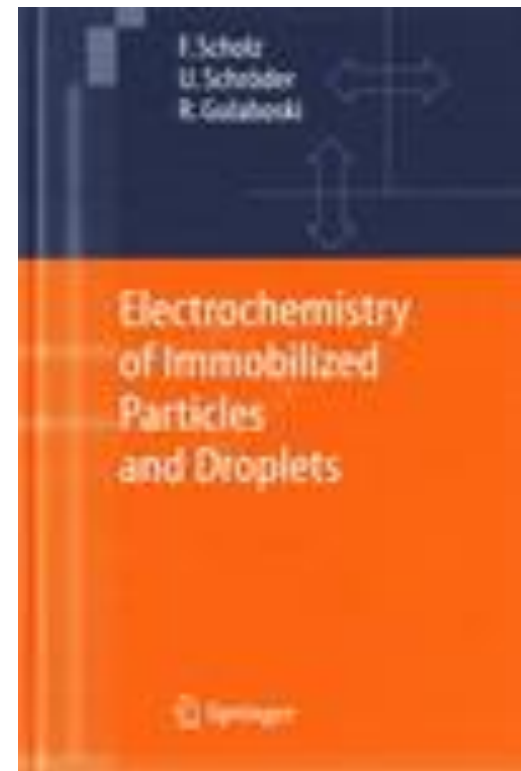
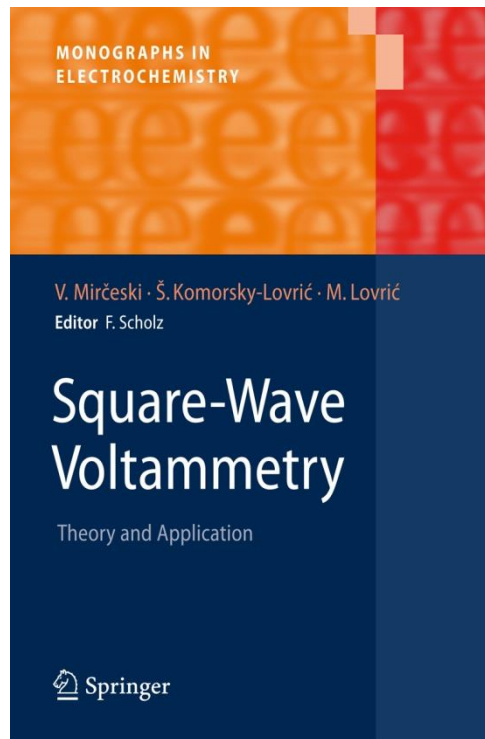
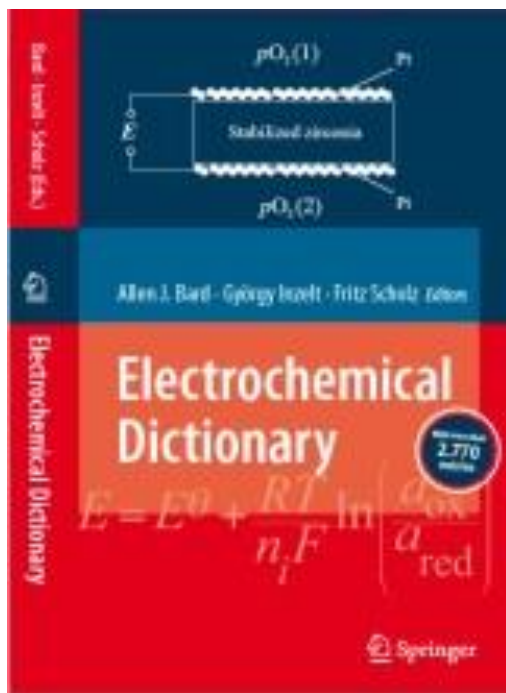
11. Electrochemical Quantification of Extracellular Local H_2O_2 Kinetics Originating from Single Cells M Bozem, P Knapp, **V Mirčeski**, EJ Slowik, I Bogeski, R Kappl, ... Antioxidants & redox signaling 29 (2018), 501-517

12. Electrochemical Faradaic Spectroscopy, D Jadreško, D Guziejewski, **V Mirčeski** ChemElectroChem 5 (2018), 187-194

13. RECENT ADVANCES AND PROSPECTS OF SQUARE-WAVE VOLTAMMETRY **V Mirčeski**, L Stojanov, S Skrzypek, Contributions, Section of Natural, Mathematical and Biotechnical Sciences 39 (2018)

14. Step Potential as a Diagnostic Tool in Square-Wave Voltammetry of Quasi-reversible Electrochemical Processes, **V Mirceski**, L Stojanov, B Ogorevc, Electrochimica Acta, 134 (2019)

15. A. Chibisev, C Bozinovska, R. **Gulaboski**, Clinical evaluation and management of acute corrosive poisoning in adult patients - A ten year experience. Am. J. Emerg. Med. 36 (2018) 328-329
16. Electroanalysis of the Anthelmintic Drug Bithionol at Edge Plane Pyrolytic Graphite Electrode, M Brycht, K Konecka, K Sipa, S Skrzypek, **V Mirčeski**, Electroanalysis 31 (2019)
17. Electrochemistry of hydrogen peroxide reduction reaction on carbon paste electrodes modified by Ag-and Pt-supported carbon microspheres MS Randjelović, MZ Momčilović, D Enke, **V Mirčeski**, Journal of Solid State Electrochemistry 23 (2019), 1257-1267
18. Correlation between composition, electrical and electrochemical properties of $\text{LnCo}_{1-x}\text{Cr}_x\text{O}_3$ (Ln = Pr, Gd and $x = 0, 0.5$ and 1) perovskites S Dimitrovska-Lazova, S Aleksovskva, **V Mirceski**, M Pecovska-Gjorgjevich, Journal of Solid State Electrochemistry 23 (2019), 861-870
19. Non-enzymatic Amperometric Sensor for H₂O₂ Based on MnCO₃ Thin Film Electrodes, S Stojkovikj, M Najdoski, B Sefer, **V Mirčeski**, Croatica Chemica Acta 91 (2018), 1-9
20. Square-wave voltammetry, **V Mirceski**, S Skrzypek, L Stojanov ChemTexts 4 (2018), 17
21. Bioactive compounds and “in vitro” antioxidant activity of some traditional and non-traditional cold-pressed edible oils from Macedonia, S. Veličkovska, AC Moł, S Mitrev, R **Gulaboski**, L Brühl, H Mirhosseini, Journal of food science and technology 55 (2018) 1614-1623
22. V. Mirceski, D. Guzijewski, L. Stojanov, **R. Gulaboski**, Staircase square-wave voltammetry, Analytical Chemistry, ac-2019-03035u, (2019)



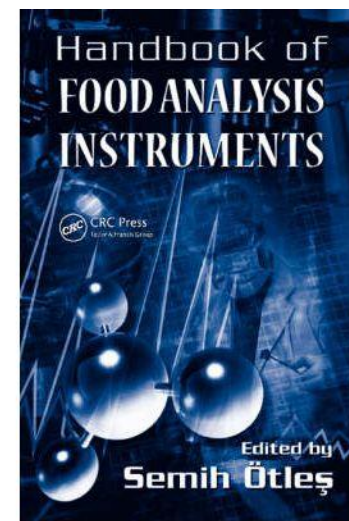
F. Scholz, U. Schroeder, R. Gulaboski

ELECTROCHEMICAL DICTIONARY (2012) 2015

A. J. Bard, G. Inzelt, F. Scholz (editors)

R. Gulaboski, C. M. Pereira in
Handbook of Food Analysis Instruments (2008)

Semih Otles (Ed.)



+ Add co-authors
 We have co-authors suggestions.
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prof. d-r Rubin Gulaboski (Dr.rer.nat)

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Professor of Physical Chemistry and Biochemistry, Goce Delcev University, Stip, MACEDONIA

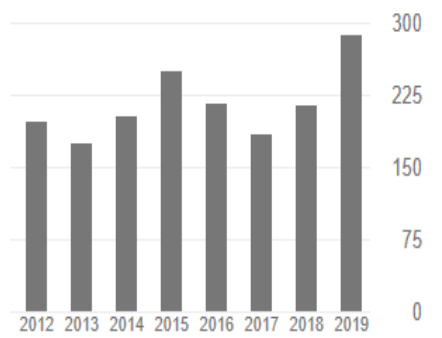
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h-index	34	21
i10-index	55	42

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<input type="checkbox"/>	Electrochemistry of immobilized particles and droplets F Scholz, U Schröder, R Gulaboski Springer	321	2005
<input type="checkbox"/>	Determining the Gibbs Energy of Ion Transfer Across Water–Organic Liquid Interfaces with Three-Phase Electrodes F Scholz, R Gulaboski ChemPhysChem 6 (1), 16-28	118	2005
<input type="checkbox"/>	An electrochemical method for determination of the standard Gibbs energy of anion transfer between water and n-octanol	118	2002



Co-authors [EDIT](#)



Valentin Mirceski

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Professor of chemistry, Institute of chemisry, Faculty of natural Sciences and mathematis, University "Ss Cyril and Methodius" S

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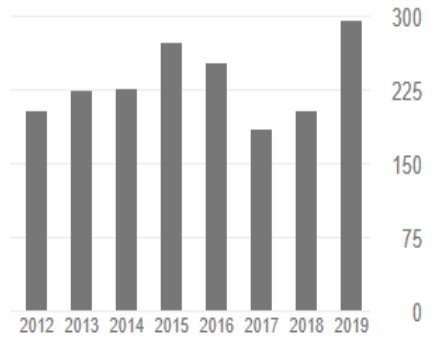
Electroanalysis electrode kinetics modelling of electrode proc...

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	All	Since 2014
Citations	3119	1436
h-index	34	20
i10-index	77	43

TITLE	CITED BY	YEAR
<p>Square-wave voltammetry: theory and application V Mirceski, S Komorsky-Lovric, M Lovric Springer Science & Business Media</p>	319	2007
<p>An electrochemical method for determination of the standard Gibbs energy of anion transfer between water and n-octanol R Gulaboski, V Mirčeski, F Scholz Electrochemistry communications 4 (4), 277-283</p>	118	2002
<p>Square-wave voltammetry: a review on the recent progress V Mirceski, R Gulaboski, M Lovric, I Bogeski, R Kappl, M Hoth Electroanalysis 25 (11), 2411-2422</p>	102	2013
<p>Standard partition coefficients of anionic drugs in the n-octanol/water system determined by voltammetry at three-phase electrodes G Bouchard, A Galland, PA Carrupt, R Gulaboski, V Mirčeski, F Scholz, ... Physical Chemistry Chemical Physics 5 (17), 3748-3751</p>	93	2003
<p>Split square-wave voltammograms of surface redox reactions V Mirčeski, M Lovrić</p>	83	1997



F. Scholz-Germany	V. Mirceski-Macedonia	J. Zhao-Taiwan
M. Hoth-Germany	M. Lovric-Croatia	H Girault-Swiss
R. Kappl-Germany	S. Lovric-Croatia	A. Galand-Swiss
M. Bozem-Germany	V. Maksimova-Macedonia	J Bouchard-Swiss
I. Bogeski-Germany	Cankov-Bulgaria	D. Uzun-Cyprus
K. Kumerow-Germany	Catalin-Romania	Kutzki B-Germ
S. Pasteka-Germany	Jihe Zhu-China	Morgenstern-Germ
B. Hoth-Germany	K Caban-Poland	Sepppe-Germ
A. Kretzchman-Germany	U. Schroeder-Germany	Alenka K-Ukraine
Maurice L Her-France	S. Aleksovska-Macedonia	Belousov-Russia
Zbigniew Stojek-Poland	V. Ivanovski-Macedonia	Podvorica-Kosovo
C. Pereira-Porto	Randjelovic-Serbia	Eva Hey Howkins
N. Cordeiro-Porto	M. Stefova-Macedonia	-...Germany
M. Chirea-Turkey	M. Jorge-Portugal	A. Aleksovska-MKD
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Darek ...Poland		Nikolina, Kate-MKD

OUR ADVISES to the young Students and Academic staff from MACEDONIA

-If you dream to make money from doing science...forget it

-be persistent, find a good supervisor, always ask for more...

-try to find collaborators from abroad, make student exchanges

-GERMANY is always first choice for supporting you

-create as more as possible friends and supporters

-if you find position abroad...do not forget to get back to MKD

-learn more instrumental techniques

-NEVER GIVE UP....

**We will be always at your side to support you and to
give you motivation, recommendations...**

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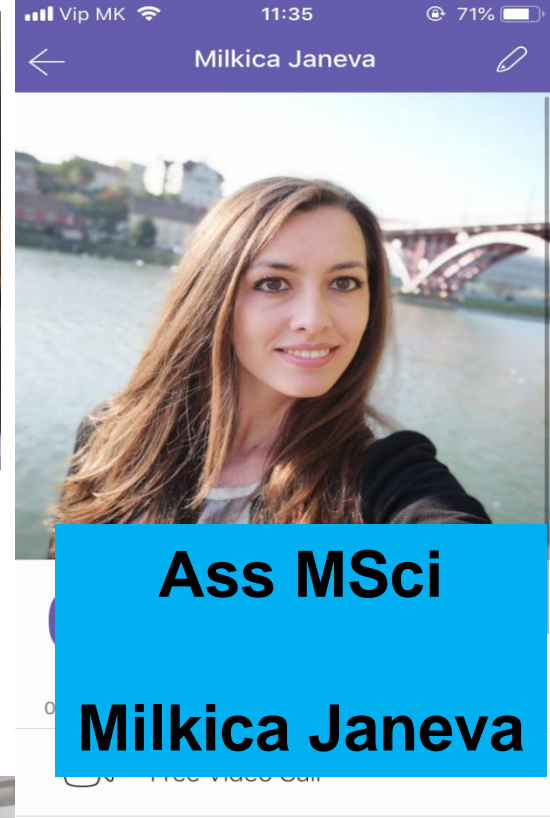
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