



Editors:

Prof. Viorel Munteanu, ROMANIA

Prof. Razvan Raducanu, ROMANIA

Prof. Gheorghe Dutica, ROMANIA

Prof. Anca Croitoru, ROMANIA

Prof. Valentina Emilia Balas, ROMANIA

RECENT ADVANCES IN MATHEMATICS AND COMPUTERS IN BUSINESS, ECONOMICS, BIOLOGY & CHEMISTRY

Hosted and Sponsored by:

"G. Enescu" University



"G. Enescu" University, Iasi, Romania, June 13-15, 2010

- Proceedings of the 11th WSEAS International Conference on Mathematics and Computers in Business and Economics (MCBE '10)
- Proceedings of the 11th WSEAS International Conference on Mathematics and Computers in Biology and Chemistry (MCBC '10)



RECENT ADVANCES in MATHEMATICS and COMPUTERS in BUSINESS, ECONOMICS, BIOLOGY & CHEMISTRY

**Proceedings of the 11th WSEAS International Conference on
MATHEMATICS AND COMPUTERS IN BUSINESS AND
ECONOMICS (MCBE '10)**

**Proceedings of the 11th WSEAS International Conference on
MATHEMATICS AND COMPUTERS IN BIOLOGY AND
CHEMISTRY (MCBC '10)**

**"G. Enescu" University, Iasi, Romania
June 13-15, 2010**

Mathematics and Computers in Science Engineering
A Series of Reference Books and Textbooks

Published by WSEAS Press
www.wseas.org

ISSN: 1790-2769
ISBN: 978-960-474-194-6

RECENT ADVANCES in MATHEMATICS and COMPUTERS in BUSINESS, ECONOMICS, BIOLOGY & CHEMISTRY

**Proceedings of the 11th WSEAS International Conference on
MATHEMATICS AND COMPUTERS IN BUSINESS AND
ECONOMICS (MCBE '10)**

**Proceedings of the 11th WSEAS International Conference on
MATHEMATICS AND COMPUTERS IN BIOLOGY AND
CHEMISTRY (MCBC '10)**

"G. Enescu" University, Iasi, Romania, June 13-15, 2010

Mathematics and Computers in Science Engineering
A Series of Reference Books and Textbooks

Published by WSEAS Press

www.wseas.org

Copyright © 2010, by WSEAS Press

All the copyright of the present book belongs to the World Scientific and Engineering Academy and Society Press. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the Editor of World Scientific and Engineering Academy and Society Press.

All papers of the present volume were peer reviewed by two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.
See also: <http://www.worldses.org/review/index.html>

ISSN: 1790-2769

ISBN: 978-960-474-194-6



World Scientific and Engineering Academy and Society

**RECENT ADVANCES in
MATHEMATICS and COMPUTERS
in BUSINESS, ECONOMICS,
BIOLOGY & CHEMISTRY**

**Proceedings of the 11th WSEAS International Conference on
MATHEMATICS AND COMPUTERS IN BUSINESS AND
ECONOMICS (MCBE '10)**

**Proceedings of the 11th WSEAS International Conference on
MATHEMATICS AND COMPUTERS IN BIOLOGY AND
CHEMISTRY (MCBC '10)**

**"G. Enescu" University, Iasi, Romania
June 13-15, 2010**

Editors:

Prof. Viorel Munteanu, G. Enescu University, Romania
Prof. Razvan Raducanu, Al. I. Cuza University, Romania
Prof. Gheorghe Dutica, G. Enescu University, Romania
Prof. Anca Croitoru, Al. I. Cuza University, Romania
Prof. Valentina Emilia Balas, Aurel Vlaicu University, Romania

International Program Committee Members:

Charles A. Long, USA
Photios Anninos, Greece
Tuan Pham, Australia
W. Lakin, USA
George Anastassopoulos, Greece
Lotfi A. Zadeh, USA
Tim Crane, UK
Mary C. Waters, USA
Mark J. Perry, USA
Ronald Yager, USA
W. J. Federspiel, USA
Nikos E. Mastorakis, Bulgaria
D. Perkins, USA
Dionysios (Dion) D. Dionysiou, USA
Leonid Perlovsky, USA
C. Bignardi, Italy
Kent Davey, USA
David Landgrebe, USA
Leon Trilling, USA
N. Afgan, Portugal
Morris Adelman, USA
Robert L. Bishop, USA
Glenn Loury, USA
Fernando Alvarez, USA
Leon O. Chua, USA
Brian A. Barsky, USA
K. R. Rao, USA
Bimal K. Bose, USA
Joseph Sifakis, France
Sidney Burrus, USA
Biswa Nath Datta, USA
Panos Pardalos, USA
Stamatios Kartalopoulos, USA
Gamal Elnagar, USA

Preface

This year the 11th WSEAS International Conference on MATHEMATICS AND COMPUTERS IN BUSINESS AND ECONOMICS (MCBE '10) & 11th WSEAS International Conference on MATHEMATICS AND COMPUTERS IN BIOLOGY AND CHEMISTRY (MCBC '10) were held at "G. Enescu" University, Iasi, Romania, June 13-15, 2010. The conferences remain faithful to their original idea of providing a platform to discuss mathematical methods, computational techniques, statistical methods, mathematical or computer analysis of experimental methods, mathematical models (deterministic and stochastic), modelling and simulation, experiments and computer analysis, optimization, advanced mathematics (differential geometry, operator analysis, non-linear analysis and chaos), computer science (data bases, data structures, software engineering, reliability), practical methods, empirical and semi-empirical methods, bio-engineering, chemical engineering etc. with participants from all over the world, both from academia and from industry.

Their success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of these conferences are published in this Book that will be indexed by ISI. Please, check it: www.worldses.org/indexes as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

Conferences such as these can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

Table of Contents

Plenary Lecture 1: Option Pricing Model Based on Telegraph Processes	14
<i>Nikita Ratanov</i>	
Plenary Lecture 2: The Deterministic, Stochastic and Fuzzy Economic Games	15
<i>Mihaela Neamtu</i>	
Plenary Lecture 3: Endotoxin Tolerance: Mathematical Models	16
<i>Mircea Olteanu</i>	
Plenary Lecture 4: Molecular Simulation and Experimental Approaches to Molecules and Ions Confined in Hydrophobic Solid Nanospaces for Sustainable Engineering	17
<i>Katsumi Kaneko</i>	
Plenary Lecture 5: DNA Combination and Recombination State	18
<i>Jelenka Savkovic-Stevanovic</i>	
Decomposing Productivity Differential Among Groups of Firms: A Novel Inequality Decomposition	19
<i>Rosa Bernardini Papalia, Pinuccia Calia</i>	
Software Economics: Quality-Based Return-on-Investment Model	25
<i>Ljubomir Lazic, Nikos E. Mastorakis</i>	
Aspects of Mathematics and Music in Ancient Greece	40
<i>Sofia Kontossi, Razvan Raducanu</i>	
Mechanical Characteristics for Orthodontic NiTi Wires	44
<i>Camelia Szuhaneck, T. Fleser</i>	
Mechanical Behavior of TMA Orthodontic Wires	49
<i>Camelia Szuhaneck, T. Fleser, Florica Glavan</i>	
Multilinear Completely Bounded Projective u-Covariant Maps Extended on Twisted Crossed Products	54
<i>Tania-Luminita Costache</i>	
Using Risk Assessment in IT Audit Implementation	62
<i>Cristian Amancei, Traian Surcel</i>	
Endotoxin Tolerance: Mathematical Models	67
<i>Paul Flondor, Micea Olteanu, Catalin Vasilescu</i>	
Knowledge Modeling for Strategic Innovation Management	74
<i>Edson Pacheco Paladini, Fabricia Goncalves De Carvalho</i>	
Simulation Approach for Detection of the Self-Sustained Oscillations in Continuous Culture	80
<i>Piotr Skupin</i>	

Kaldor-Kalecki Stochastic Model of Business Cycles	86
<i>Gabriela Mircea, Mihaela Neamtu, Laura Cismas, Dumitru Opris</i>	
A Comparative Study on the Fractal Dimension Method and the Time Series Analysis with Applications in Medical Imaging	92
<i>Andreea Udrea, Mircea Olteanu</i>	
The Influence of the Utility Function on the Dynamics of the Underground Economy	99
<i>Alina Badulescu, V. A. Caus</i>	
Models of the Minimum Wage Impact upon Employment, Wages and Prices: The Romanian Case	104
<i>Madalina Ecaterina Andreica, Larisa Aparaschivei, Amalia Cristescu, Nicolae Cataniciu</i>	
The Deterministic and Stochastic Economic Games	110
<i>Mihaela Neamtu</i>	
Computer-based Model for Developing Business Students' Skills	116
<i>Andreea Zamfir, Ion Plumb</i>	
Case Study on Pollution Prediction through Atmospheric Dispersion Modelling	122
<i>Mihaiella Cretu, Victoria Teleaba, Silviu Ionescu, Adina Ionescu</i>	
DNA Combination and Recombination State	128
<i>Jelenka Savkovic-Stevanovic</i>	
A Panel Data Analysis of the Connection between Employee Remuneration, Productivity and Minimum Wage in Romania	134
<i>Maria Denisa Antonie, Amalia Cristescu, Nicolae Cataniciu</i>	
Microbial Population Age	140
<i>Jelenka Savkovic-Stevanovic</i>	
Learning and Discovering in Chemistry	146
<i>Jelenka Savkovic-Stevanovic</i>	
Autocorrelation Function of the poly-L-glycine	152
<i>Ljubica Vilendecic-Grkinic</i>	
Chemometric Analysis of the Reaction Systems	158
<i>Tatjana N. Mosorinac</i>	
Data Visualization in Business Intelligence	164
<i>Dinu Airinei, Daniel Homocianu</i>	
The Security of Web 2.0 and Digital Economy	168
<i>Razvan Raducanu, Maria Moisuc</i>	
On the Security of E-Commerce	171
<i>Razvan Raducanu, Eduard Omusoru</i>	
Optimal Conditions for the Control Problem Associated to a Ramsey Model with Endogenous Population	175
<i>Olivia Bundau, Mihaela Neamtu</i>	

A Regression Model for Polytomous Data and its Application <i>Alexander Andronov, Nadezda Kolmakova, Irina Yatskiv</i>	181
Poverty and Income Growth: Measuring Pro-Poor Growth in the Case of Romania <i>Eva Militaru, Cristina Stroe</i>	187
An Autoregressive Short-Run Forecasting Model for Unemployment Rates in Romania and the European Union <i>Liana Son, Gratiela Georgiana Carica, Vasilica Ciuca, Daniela Pasnicu</i>	193
Revisiting the Relationship between Unemployment Rate and the Size of the Shadow Economy for United States using Johansen Approach for Cointegration <i>Adriana Anamaria Alexandru, Ion Dobre, Catalin Corneliu Ghinararu</i>	199
Education-Job Match among Romanian University Graduates - A Gender approach <i>Speranta Pirciog, Eliza Olivia Lungu, Cristina Mocanu</i>	205
Preserving Consistency and Security of Data in E-business Applications <i>Cristea Boboila, Nicolae Constantinescu, Costin-Radu Boldea</i>	211
Elliptic Curves Cryptosystems for ECommerce Applications <i>Nicolae Constantinescu, Costin Boldea, Cristea Boboila</i>	216
Natural Resources Management of Wild Species: an Evolutionary Approach <i>Costin R. Boldea, Cristea Boboila, Nicolae Constantinescu</i>	222
The Optimal Level of Public Expenditure <i>Plesea Doru, Adina Camarda</i>	227
Dacia-Group Renault - Focus to Customers' Satisfaction <i>Lucretia Mariana Constantinescu, Violeta Dragoi, Ioana Raluca Goldbach</i>	232
A New Firm-Wide IT Capability Construct - Research Study of Enterprise Companies on Croatian Market <i>Zlatan Zmirak</i>	238
New Issues in the Exergoeconomic Analysis of Cryogenic Systems for Nuclear Facilities <i>Sorin Gherghinescu</i>	244
Mathematical Models for D2-DTO Isotopic Exchange Process of Detritiation Systems <i>Sorin Gherghinescu</i>	250
Exergetic Analyse for the Cooling Systems with R-407 Refrigerant for Application in Nuclear Plants <i>Sorin Gherghinescu</i>	255
Adaptable Enterprise Modeling – A New Challenge for Collaborative Data and Process-Aware Management Systems <i>Ion Lungu, Andrei Mihalache</i>	261
Estimating Spatial Interaction Models using Panel Data: a Generalized Maximum Entropy formulation <i>Rosa Bernardini Papalia</i>	267

Customizing Web Advertisements based on Internet Users' Location	273
<i>Radu Lixandroi</i>	
The University Performance - A Result of Total Quality Management	279
<i>Lucretia Mariana Constantinescu, Maria Cristina Enescu, Ioana Raluca Goldbach, Floriana Andra Cucui</i>	
Environmental Policy and Industrial Innovation: Integrating Environment and Economy through Ecological Modernisation	285
<i>Gabriela Popa, Cristiana-Zizi Rizescu, Ofelia-Valentina Robescu, Cezarina Necula</i>	
Opportunities Related to Listing Shares Issued by BSE / Bucharest Stock Exchange	290
<i>Angela Eliza Micu</i>	
Determining Risks Resulted from Issued by Bucharest Stock Exchange	296
<i>Angela Eliza Micu</i>	
The Optimal Level of Public Expenditure	302
<i>Plesea Doru, Adina Camarda</i>	
Using the Expert Systems in the Operational Management of Production	307
<i>Ioan Constantin Dima, Janos. Gabrara, Vladimir Modrak, Pachura Piotr, Constanta Popescu</i>	
Petroleum and its Impact on the Contemporary Economy Found in a Process of Globalization	313
<i>Georgiana Dinca, Andrei Toma, Felicia Dumitru, Gratiela Gavrila</i>	
The Impact of the Organizational Culture on the Romanian Companies' Competitiveness on the Global Market	318
<i>Adrian Micu, Constantin Afanase, Alexandru Capatina</i>	
Recurrence Relations for the Moments of Record Values from Right Truncated Inverse Weibull Distribution	325
<i>M. Aleem, A. A. Shah</i>	
The Importance of Effective Organizational Structures in the Battle for Competitiveness	330
<i>Constanta Popescu, Maria Luiza Hrestic, Maria Cristina Stefan</i>	
Scientific Research in Public Relations Domain	334
<i>Dorina Tanasescu, Petruta Vlad, Irina Ionescu, Madalina Barna</i>	
The Use of Marketing Research for the Improvement of the Marketing Mix of the Company	339
<i>Andrei Toma, Dorina Tanasescu, Laura Marcu, Georgiana Dinca</i>	
Management System Organization of the Regional and Local Development According to EU Standards	343
<i>Maria-Cristina Stefan, Leonardo Badea, Corneliu Stefan, Valentina-Ofelia Robescu</i>	
The International Financial Crisis and the Management of Romanian Enterprises	347
<i>Carmen Diaconescu, Gabriela Popa, Ioana Munteanu</i>	
Angiotensin Receptor Blocker Directly Binds to HSP and Stimulates its Production in the Brain	350
<i>Taku Sugawara, Kohei Kokubun, Ryuichi Ishida, Kazuhiko Fujiwara, Sou Yamamoto, Hiroyuki Kinouchi, Hideaki Itoh, Kazuo Mizoi</i>	

Social Organization of Ancient Iranian Traditional Medical System	358
<i>Rahim Farrokhnia</i>	
Genome Response of Model Insect Group (Chironomidae Diptera) to Trace Metal Contaminants in the Environment	366
<i>Paraskeva Michailova, Gabriella Sella, Ninel Petrova</i>	
About Optimal Remanufacturing Policies and Secondary Markets Supplying	373
<i>M. Gallo, G. Guizzi, G. Naviglio</i>	
Authors Index	379

Plenary Lecture 1

Option Pricing Model Based on Telegraph Processes



Professor Nikita Ratanov

Universidad del Rosario

Bogota, Colombia

E-mail: nratanov@urosario.edu.co

Abstract: A new class of financial market models is proposed. These models are based on continuous time random motions with alternating constant velocities c_{\pm} (so called "telegraph" process) and with jumps h_{\pm} occurring when the velocities are switching. While such markets may admit an arbitrage opportunity, the model under consideration is arbitrage-free and complete if directions of jumps in stock prices are in a certain correspondence with their velocity and interest rate behaviour. In the framework of this model we capture bullish and bearish trends in a market evolution. Values h_{\pm} describes sizes of possible crashes, jumps and spikes. Thus, we study a model that is both realistic and general enough to enable us to incorporate different trends and extreme events. We construct financial market model based on the random processes with finite velocities which possess a simplicity of Black-Scholes model. Replicating strategies for European options are constructed in detail. Explicit formulae for option prices are obtained. Some peculiarities as memory effects and a detailed description of volatility are discussed also.

Brief Biography of the Speaker:

Nikita Ratanov is affiliated as a professor of Economics faculty of University of Rosario, Bogota, Colombia. He was trained in Moscow State University (Diploma, 1976; PhD degree in Mathematics, 1984). He has DrSci degree also (Russian Academy of Sciences, 1999).

His research interests concern with stochastic analysis with application in financial modelling and mathematical physics. He is author of more than 70 papers published in reviewed journals or presented at international conferences. He wrote two textbooks of stochastic analysis in financial modelling for students of economics and applied mathematics faculties (in Russian and in Spanish).

Plenary Lecture 2

The Deterministic, Stochastic and Fuzzy Economic Games



Professor Mihaela Neamtu

Department of Economic Informatics and Statistics
Faculty of Economics, West University of Timisoara
Romania

E-mail: mihaela.neamtu@feaa.uvt.ro

Abstract: In this paper the static model of the Cournot duopoly with tax evasion, the dynamic model of the Cournot duopoly with tax evasion and the rent seeking game with tax evasion and time delay are presented. A study for the local stability of the stationary states is carried out. Also, the stochastic approach is taken into consideration. A Wiener process is used to describe the stochastic model, as the noise has a stabilization effect. The dynamics are studied in terms of stochastic stability in the stationary state, by constructing the Lyapunov exponent, depending on the parameters that describe the model. Also, the Lyapunov function is determined in order to analyze the mean square stability. The numerical simulations justify the theoretical results. Moreover, the hybrid models are associated to the deterministic models using the Wiener and Liu processes. Numerical simulations are performed for the above mentioned processes. Finally, conclusions regarding the economic processes are provided.

Brief Biography of the Speaker:

MIHAELA NEAMTU was born in Timisoara (Romania) on 1971. She graduated in 1995 the Faculty of Mathematics, West University of Timisoara. In 2001 she obtained the title of Ph.D in mathematics. She followed a didactic career at the Faculty of Economics and Business Administration, West University of Timisoara, Romania and she is currently a professor. She has been a visiting Professor for short periods of time at The Nottingham Trent University, Economics & Politics (Great Britain) and Faculty of Mathematics, Bonn (Germany). Professor Mihaela Neamtu has over 50 articles published in Journals and Proceedings of the International Conferences and 3 monographs; she has been a regular referee of papers for several International Journals and a reviewer of Mathematical Reviews (MathSciNet). She has been participating in 10 multiannual grants (1 of them is international), in 8 as a member and in 2 as a director. Her main academic interests are in dynamical systems and applications in biology and economy, geometrical mechanics.

Plenary Lecture 3

Endotoxin Tolerance: Mathematical Models



Professor Mircea Olteanu

Mathematics Department

University Politehnica Bucharest, Romania

E-mail: mirolteanu@yahoo.co.uk

Co-authors: Paul Flondor, Radu Dobrescu, Catalin Vasilescu

Abstract: Endotoxin tolerance is an important phenomenon of innate immunity. It is usually defined as “a reduced responsiveness to a lipopolysaccharide (LPS) challenge following a first encounter with endotoxin.” The actors of the endotoxin tolerance are a Gram-negative bacterial lipopolysaccharide (LPS), the proinflammatory cytokines (the best marker of the inflammatory process is considered to be the TNF- α) and the downregulating factors. It has to be noted that there are three possible outcomes at a secondary challenge with endotoxin: 1) the first and the second responses have the same magnitude, 2) the second response is greater than the first one and 3) the second response is lower than the first one. This last outcome is known as the typical endotoxin tolerance phenomenon. There are many reasons which explain the interest in understanding the endotoxin tolerance (for example, the connections with sepsis). It would be of great help to have a simple but good enough mathematical model for testing and simulating endotoxin tolerance in various reported situations and also for a better understanding of the factors acting during this complex phenomenon. In some previous works the authors introduced an original mathematical (ODE) model of endotoxin tolerance. The aim of this lecture is to present this model and some new improvements together with applications (mainly in sepsis). Our original mathematical model of the endotoxin tolerance is based on a generalized version of the Michaelis - Menten - Hill equations for enzymatic reactions. This is a nonlinear and non autonomous ODE - time delayed system with LPS as an input. We also tried to keep our model as simple as possible; the model could be, of course, developed to a more sophisticated one. In order to test our model we considered several typical scenarios for the input (LPS challenge) such as: in vivo, in vitro, immune paralysis (clinical sepsis). In each case, the mathematical simulation fit well-enough with the reported experimental data.

Brief Biography of the Speaker:

Mircea Olteanu is professor at the Dept. of Mathematics of the Politehnica University of Bucharest, Romania. His area of study includes group representation theory, time invariant systems, nonlinear analysis of time series and mathematical modeling. He is the author of more than 40 scientific papers. Regarding the mathematical modeling of the endotoxin tolerance (the subject of this plenary lecture) he published several studies (as coauthor with Paul Flondor, Catalin Vasilescu, Radu Dobrescu) in Amer. J. of Surgery, Inflammation Research, Journal of Critical Care, Chirurgia.

Plenary Lecture 4

Molecular Simulation and Experimental Approaches to Molecules and Ions Confined in Hydrophobic Solid Nanospaces for Sustainable Engineering



Professor Katsumi Kaneko

Graduate School of Science

Chiba University, Japan

E-mail: kaneko@pchem2.s.chiba-u.ac.jp

Abstract: Nanoporous solids such as activated carbon fiber (ACF), single wall carbon nanotube(SWCNT), double wall carbon nanotube(DWCNT), single wall carbon nanohorn(SWCNH), and metal organic framework (MOF) s have nanoscale spaces offering the deep interaction potential wells for molecules and ions, which can be helpful to construct sustainable technology. In this lecture, unusual adsorption behaviors for molecules and ions which have been shown with experimental techniques and molecular simulation.

Even supercritical gas molecules of H₂ and CH₄ are physically adsorbed predominantly in the nanospaces of ACF, SWCNT, and DWCNT above the bulk critical temperature, giving their dense states comparable to the bulk liquid or solid phase. Typical examples will be presented. Reactivated ACF shows superior adsorptivity for supercritical CH₄: 190 vol.% at 3.5 MPa and 303 K is larger than the DOE target value (180 vol.%). The relationship between supercritical H₂ adsorptivity and nanostructure will be given: DWCNT shows better adsorptivity than SWCNT and intercalation of C₆₀ enhances the adsorptivity of SWCNT due to increase of the interstitial nanoporosity. The nanospaces show a marked quantum molecular sieving effect for H₂ and D₂, which are evidenced for SWCNH, SWCNT, and Cu-MOF with quantum grand canonical Monte Carlo simulation.

Water adsorption in nanogate-donated SWCNH indicates the new mechanism of cluster-chain-cluster on penetration of 0.4 nm-gate of the SWCNH wall. This mechanism is supported by molecular dynamics.

The effect of addition of organic electrolytes on the structure of organic solvent propylene carbonate (PC) was examined by synchrotron X-ray and reverse Monte Carlo simulation; addition of the electrolytes promotes orientation of PC molecules in the slit nanospaces of 1 nm in width.

Brief Biography of the Speaker:

Katsumi Kaneko is a professor of chemistry (physical chemistry), Department of Chemistry, Graduate School of Science, Chiba University. He received Dr. of Science from University of Tokyo. He developed new characterization methods for nanoporous materials and elucidated adsorption states of molecules and ions; he applied molecular and solid state sciences to adsorption to establish nanospace molecular science.

He has been an Editor of Adsorption Science and Technology and currently on the Advisory Board of several international journals such as Carbon, Journal Experimental Nanoscience, Adsorption, and the Journal of Porous Materials, and has been elected to a directorship of the Chemical Society of Japan, whilst he has previously been a Chairman of the Division of Colloid and Interface Chemistry of the Chemical Society of Japan, and President of the International Adsorption Society (2005-2008).

His work has been reported in more than 380 international journal papers and more than 40 invited international conference presentations, and has been recognized by an award from the Chemical Society of Japan in 1999 and by the American Carbon Society, who awarded him the Charles E. Pettinos Award in 2007.

Plenary Lecture 5

DNA Combination and Recombination State



Professor Jelenka Savkovic-Stevanovic

Faculty of Technology and Metallurgy

Belgrade University

Karadjicjeva 4, 11000 Belgrade

Serbia

E-mail: savkovic@tmf.bg.ac.rs

Abstract: The discovery that genetic information is coded along the length of a polymeric molecule composed of only four types of monomeric units is one of the major scientific achievements of last century. The content of DNA resides in the sequence in which these monomers, purine and pyrimidine deoxyribonucleotides are ordered.

A particular sequence of nucleotides says the same thing to one organism as it does to another, differences between organisms reflect genetic programs of different nucleotides sequences.

The concomitant advances in theory, measuring systems, and DNA sequencing techniques bring new perspectives to the helix-to-coil transition. Using the advanced theory, one can evaluate the stability of individual base pairs, it is also possible to estimate the probability of each base pair being in an open state. These stability map and base pair association opening provide unique information about the roles of specific regions in various biologically important processes, such as replication, transcription, recombination, and so on.

Under ordinary condition, native DNA in an aqueous solution takes a double stranded structure, known as B-form. This double stranded structure is maintained by two main forces hydrogen bonds between complementary pairs on opposite strands, and stacking interactions between neighboring base pairs. Although the contributions of these and other interactions to stabilizing DNA double helix have not yet been critically evaluated, it is believed that the stacking interaction makes the dominant contribution.

Since the latter are closer to physiological conditions, the relationship between functional and thermodynamic properties of specified regions on a DNA molecule is better illustrated in the base pair opening profile.

The two complementary strands comprising the double helix can be separated into single stranded random coils in various ways. Since the random coils have a larger degree of conformational freedom than the ordered double-stranded structure, the ordered structure is disrupted with an increase in temperature or denaturing agents.

While a thermal stability map reflects status of DNA molecules during the helix-coil transition, a base pair opening profile represents their state under premelting conditions.

The presence of massive numbers 10^{12} of molecules representing each particular edge and vertex of the graph allowed for all possible molecular combinations to form simultaneously with their reaction bath.

Brief Biography of the Speaker:

Full professor, University of Belgrade, Faculty of Technology and Metallurgy, Serbia. Education: B.Sc. and M.Sc. degree, University of Belgrade, PhD Thesis Technical University of Berlin and University of Belgrade. Research interest: Chemical Engineering and Process System Engineering; Modelling, Analysis, Synthesis, Design, Process optimization; Advanced numerical methods, Control and On-line optimization; Computer Aided Process Operation and Design, Safety and Risk analysis; Information System, Data base, Expert systems, Learning Systems; Informatics, Management; Artificial Intelligence, Neural Networks and Fuzzy logics; Biosystems, Bioinformatics, Pharmaceutical and Biomedical Engineering. Other professional activities: Over 800 papers, 8 books, patentees in the field, Consultant in many companies, Member of many professional organizations, Reviewer of many journals, Citation Index over 200. She has cited in many monographs and she is One of the World's 100 Top Scientists- IBC Cambridge.

Authors Index

Afanase, C.	318	Flondor, P.	67	Neamtu, M.	86, 110, 175
Airinei, D.	164	Fujiwara, K.	350	Necula, C.	285
Aleem, M.	325	Gabrara, J.	307	Olteanu, M.	67, 92
Alexandru, A. A.	199	Gallo, M.	373	Omusoru, E.	171
Amancei, C.	62	Gavrila, G.	313	Opris, D.	86
Andreica, M. E.	104	Gherghinescu, S.	244, 250, 255	Paladini, E. P.	74
Andronov, A.	181	Ghinararu, C. C.	199	Papalia, R. B.	19, 267
Antonie, M. D.	134	Glavan, F.	49	Pasnicu, D.	193
Aparaschivei, L.	104	Goldbach, I. R.	232, 279	Petrova, N.	366
Badea, L.	343	Guizzi, G.	373	Petruta, V.	334
Badulescu, A.	99	Homocianu, D.	164	Piotr, P.	307
Barna, M.	334	Hrestic, M. L.	330	Pirciog, S.	205
Boboila, C.	211, 216, 222	Ionescu, A.	122	Plumb, I.	116
Boldea, C.	211, 216, 222	Ionescu, I.	334	Popa, G.	285, 347
Bundau, O.	175	Ionescu, S.	122	Popescu, C.	307, 330
Calia, P.	19	Ishida, R.	350	Raducanu, R.	40, 168, 171
Camarda, A.	227, 302	Itoh, H.	350	Rizescu, C.-Z.	285
Capatina, A.	318	Kinouchi, H.	350	Robescu, O.-V.	285, 343
Carica, G. G.	193	Kokubun, K.	350	Savkovic-Stevanovic, J.	128, 140, 146
Cataniciu, N.	104, 134	Kolmakova, N.	181	Sella, G.	366
Caus, V. A.	99	Kontossi, S.	40	Shah, A. A.	325
Cismas, L.	86	Lazic, L.	25	Skupin, P.	80
Ciuca, V.	193	Lixandriou, R.	273	Son, L.	193
Constantinescu, L. M.	232, 279	Lungu, E. O.	205	Stefan, C.	343
Constantinescu, N.	211, 216, 222	Lungu, I.	261	Stefan, M. C.	330, 343
Costache, T.-L.	54	Marcu, L.	339	Stroe, C.	187
Cretu, M.	122	Mastorakis, N. E.	25	Sugawara, T.	350
Cristescu, A.	104, 134	Michailova, P.	366	Surcel, T.	62
Cucui, F. A.	279	Micu, A.	318	Szuhanek, C.	44, 49
De Carvalho, F. G.	74	Micu, A. E.	290, 296	Tanasescu, D.	334, 339
Diaconescu, C.	347	Mihalache, A.	261	Teleaba, V.	122
Dima, I. C.	307	Militaru, E.	187	Toma, A.	313, 339
Dinca, G.	313, 339	Mircea, G.	86	Udrea, A.	92
Dobre, I.	199	Mizoi, K.	350	Vasilescu, C.	67
Doru, P.	227, 302	Mocanu, C.	205	Vilendecic-Grkinic, L.	152
Dragoi, V.	232	Modrak, V.	307	Yamamoto, S.	350
Dumitru, F.	313	Moisuc, M.	168	Yatskiv, I.	181
Enescu, M. C.	279	Mosorinac, T. N.	158	Zamfir, A.	116
Farrokhnia, R.	358	Munteanu, I.	347	Zmirak, Z.	238
Fleser, T.	44, 49	Naviglio, G.	373		