Final Programme

Faraday Discussion 120

NONLINEAR CHEMICAL KINETICS: COMPLEX DYNAMICS AND SPATIOTEMPORAL PATTERNS

Weston Building, UMIST,
Manchester, UK
10 – 12 September 2001

RS•C
ROYAL SOCIETY OF CHEMISTRY

Welcome

The *Faraday Discussions Volume* documents a long-established series of Faraday Discussion meetings which provide a unique international forum for the exchange of views and newly acquired results in developing areas of physical chemistry, biophysical chemistry and chemical physics.

Michael Faraday

The papers are presented in the *Faraday Discussions Volume* together with a record of the discussion contributions made at the meeting. The *Volume* therefore provides an important record of current international knowledge and views in the field concerned.

Organising Committee

Professor Steve Scott (Chairman)

Professor Peter Coveney, Professor Robert Hillman, Professor David King, Professor Philip Maini, Professor Ken Showalter and Professor Ken Waugh

Contents

The Scientific Lectures will be held in the Lecture Theatre, Weston Building, Manchester Conference Centre, UMIST.

Monday 10 September 2001 – Session 1 (pm)

14:00 **Session Chair: Professor I W M Smith**

INTRODUCTORY LECTURE
Nonlinear Kinetics: at the Crossroads of Chemistry, Physics and Life Sciences
G Nicolis
ULB, Belgium

15:00 **TEA**

15:30 **Session Chair: Professor V Gaspar**

Paper 2
A New Chemical System for Studying Pattern Formation: Bromate-Hypophosphite – Acetone – Dual Catalyst
M Orbán*, K Kurin-Csörgei, A M Zhabotinsky and I R Epstein
L Eötvös University, Budapest, Hungary

Paper 3
HPLC Analysis of Complete BZ Systems. Evolution of the Chemical Composition in Cerium and Ferroin Catalysed Batch Oscillators: Experiments and Model Calculations
L Hegedûs, M Wittmann, Z Noszticzius*, S Yan, A Sirimungkala, H-D Försterling and R J Field
Budapest University of Technology and Economics, Hungary

Paper 4
Effects of Non-Ionic Micelles on Transient Chaos in Unstirred Belousov-Zhabotinsky Reaction
M Rustici, R Lombardo, M Mangone, C Sbriziolo, V Zambrano and M L Turco Liveri*
University of Palermo, Italy

Paper 5
Nonlinear Behaviour of Simple Ionic Systems in Hydrogel in an Electric Field
D Šnita, M Pačes, J Lindner, J Kosek and M Marek*
Prague Institute of Chemical Technology, Czech Republic

Paper 6
Self-Oscillating Polymer Chain in a Laser Field
H Mayama* and K Yoshikawa
Kyoto University, Japan

18:00 **Close of Session**

18:30 **DINNER**

20:00 **Poster Session**

Tuesday 11 September 2001 – Session 2 (am)

09:00 **Session Chair: Professor S K Scott**

Paper 7
Investigation of Nonlinear Dynamical Properties by the Observed Complex Behaviour as a Basis for Construction of the Dynamical Models of Atmospheric Photochemical Systems
A M Feigin,* Y I Molkov, D N Mukhin and E M Loskutov
Russian Academy of Sciences, Nizhny Novgorod, Russia

Paper 8
Low-Dimensional Manifolds in Tropospheric Chemical Systems
A S Tomlin*, L Whitehouse, R Lowe and M J Pilling
University of Leeds, UK

Paper 9
A Numerical Study of Spatial Structure During Oscillatory Combustion in Closed Vessels in Microgravity
R Fairlie and J F Griffiths*
University of Leeds, UK

10:30 **COFFEE**

11:00 **Session Chair: Professor M Marek**

Paper 10
Spatial Bifurcations of Fixed Points and Limit Cycles During the Electrochemical Oxidation of H_2 on Pt Ring-Electrodes
P Grauel, H Varela and K Krischer*
Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany

Paper 11
Identification of the Intermittency-I Route to Chaos in the Oscillating CO Oxidation on Zeolite Supported Pd
M M Slin'ko*, A A Ukharskii, N V Peskov and N I Jaeger
Institute of Chemical Physics, RAS, Moscow, Russia

Paper 12
Paper not presented

Paper 13
Oscillatory Dynamics Protect Enzymes and Possibly Cells Against Toxic Substances
M J B Hauser*, U Kummer, A Z Larsen and L F Olsen
Otto-von-Guericke-Universität Magdeburg, Germany

12:30 **LUNCH**

Session 3 (pm)

14:00 **Session Chair: Professor P G Sorensen**

Paper 14
pH Oscillations in the Hemin-Hydrogen Peroxide-Sulfite System
M J B Hauser*, A Strich, R Bakos, Z Nagy-Ungvarai and S C Müller
Otto-von-Guericke-Universität Magdeburg, Germany

Paper 15
Control of the Excitability of Neuronal Tissue by Weak External Forces
W Hanke*, M Wiedemann and V M Fernandes de Lima
University of Hohenheim, Stuttgart, Germany

15:00 **TEA**

15:30 **Session Chairman: Professor P K Maini**

Paper 16
Spatio-Temporal Dynamics in Glycolysis
T Mair, C Warnke and S C Müller*
Otto-von-Guericke-Universität Magdeburg, Germany

Paper 17
Synchronization of Glycolytic Oscillations in Yeast Cells
S Danø*, F Hynne, S de Monte, F d'Ovidio, P G Sørensen and H Westerhoff
CATS, University of Copenhagen, Denmark

Paper 18
Complex Morphogenesis of Surfaces: Theory and Experiment on Coupling of Reaction-Diffusion Patterning to Growth
L G Harrison*, S Wehner and D M Holloway
University of British Columbia, Vancouver, Canada

Paper 19
Chemical Waves in Open Flows of Active Media: Their Relevance to Axial Segmentation in Biology
M Kærn, M Menzinger, R Satnoianu and A Hunding*
University of Copenhagen, Denmark

Paper 20
Excitability in Chemical and Biochemical pH-Autocatalytic Systems
J Zagora, M Voslař, L Schreiberová and I Schreiber*
Prague Institute of Chemical Technology, Czech Republic

18:00 **Close of Session**

19:00 **PRE-DINNER DRINKS**

19:30 **CONFERENCE BANQUET**

Wednesday 12 September 2001 – Session 4 (am)

09:00 **Session Chair: Professor K Showalter**

Paper 21
Spatial Bistability and Waves in a Reaction with Acid Autocatalysis
J Boissonade*, E Dulos, F Gauffre, M N Kuperman and P De Kepper
C.N.R.S. Bordeaux, France

Paper 22
Pattern Formation and Spatial Self-Entrainment in Bistable Chemical Systems
G Dewel*, M Bachir, S Métens and P Borckmans
Université Libre de Bruxelles, Brussels, Belgium

Paper 23
Turbulent Fronts in Resonantly Forced Oscillatory Systems
C Hemming and R Kapral*
University of Toronto, Canada

10:30 **COFFEE**

11:00 **Session Chair: Professor S C Müller**

Paper 24
Experimental and Theoretical Studies of Feedback Stabilization of Propagating Wave Segments
E Mihaliuk, T Sakurai, F Chirila and K Showalter*
West Virginia University, Morgantown, USA and Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany

Paper 25
Control and Coupling of Spiral Waves in Excitable Media
M Seipel, F W Schneider and A F Münster*
University of Würzburg, Germany

Concluding Remarks

I R Epstein
Brandeis University, USA

12:30 **LUNCH**

Close of Meeting

Monday 10 September 2001 20:00

The poster session will take place in Weston Room I, Weston Building.

P1 **The Formation of Localized Wave Initiation Sites in Aggregating Dictyostelium Discoideum**
T Godula, J Lindner and H Ševčíková*
Institute of Chemical Technology, Prague, Czech Republic

P2 **Determination of the Activity of Antioxidants Using the *Briggs-Rauscher* Oscillating Reaction**
R Cervellati*, K Hoener, S D Furrow, C Neddens and S Costa
'G Ciamician', Università di Bologna, Italy

P3 **Gravity Dependence of Waves in Gel-Type Belousov-Zhabotinsky Reaction**
W Hanke*, M Wiedemann and V M Fernandes de Lima
Universität Hohenheim, Stuttgart, Germany

P4 **Macroscopic and Microscopic Patterns Formed in Reaction-Diffusion Systems of Inorganic Compounds**
P Hantz
Eötvös Loránd University, Budapest, Hungary

P5 **Temperature-Controlled Cellular Fronts**
É Jakab*, D Horváth and Á Tóth
University of Szeged, Hungary

P6 **Nonlinear Dynamics of Safranine-O Reaction with Acidic Bromate and Role of Bromide**
S B Jonnalagadda* and N R Gollapalli
University of Durban-Westville, Durban, South Africa

P7 **Nonlinear Dynamics and Modelling Closed Chemical Systems**
S B Jonnalagadda
University of Durban-Westville, Durban, South Africa

P8 **Complex Voltammetric Response in the Course of Hydrogen Oxidation on Pt**
H Varela and K Krischer*
Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany

P9 **Pattern Formation during Periodate Reduction on Au(111) Film Electrode in $NaClO_4$ and $NaClO_4$-Camphor Electrolytes**
Y-J Li*, J Oslonovitch, N Mazouz, F Plenge and K Krischer
Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany

P10 **Effect of Pulsed Illumination on the Belousov-Zhabotinsky Reaction Catalyzed with Tris(bipyridine)Ruthenium(II) in Continuous Stirred Tank Reactor**
T Matsumura-Inoue, T Nakamura, Y Mori* and I Hanazaki
Ochanomizu University, Tokyo, Japan

P11 **Pattern Formation in Globally Coupled Electrochemical Systems with an S-Shaped Current Potential Curve**
F Plenge* and K Krischer
Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany

P12 **Bifurcation Diagrams for the Bromate-Sulphite-Ferrocyanide Reaction**
L Schreiberová, J Zagora, M Voslař and I Schreiber*
Prague Institute of Chemical Technology, Prague, Czech Republic

P13 **Complex Response to Perturbations in the CSTR with pH-Oscillating Reaction**
J Zagora, L Schreiberová and I Schreiber*
Prague Institute of Chemical Technology, Prague, Czech Republic

P14 **Mechanistic Studies on the Bromate – 1, 4-Cyclohexanedione – Ferroin Oscillatory System**
I Szalai*, K Kurin-Csörgei and M Orbán
Eötvös Loránd, University, Budapest, Hungary

P15 **Convective Instability in the Chlorite-Tetrathionate Reaction**
Á Tóth*, D Horváth and P D Ronney
University of Szeged, Hungary

P16 **Electrochemical Turbulence during the Hydrogen Oxidation on Pt in the Presence of Cl^- and Cu^{2+}**
H Varela*, A Bonnefont and K Krischer
Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany

P17 **Simulating the Effect of Polyethylene Glycol on the BZ Reaction with the MBM Model**
M Wittmann*, K Pelle, Z Noszticzius, R Lombardo and M-L Turco-Liveri
Budapest University of Technology and Economics, Hungary

P18 **Studies Concerning the Use of a pH Oscillator to Drive a Self_Oscillating Polymer Gel**
A J Ryan, R A L Jones, A Cadby, A Pryke and C J Crook*
University of Sheffield, UK

P19 **Bifurcation of Spatio-Temporal Stripe Patterns Formed by the Ag/Sb Co-Electrodeposition**
Y Nagamine* and M Hara
RIKEN (The Institute of Physical and Chemical Research), Saitama, Japan

P20 **Excitable Media in a Chaotic Flow**
Z Neufeld
University of Cambridge, UK

P21 **Chaotic Pulses in Discrete Dissipative Systems**
Y Nishiura
Hokkaido University, Sapporo, Japan

P22 **On the Direct Processing of a Chemical Signal**
J Sielewiesiuk* and J Gorecki
Polish Academy of Sciences, Warsaw, Poland

P23 **Dynamics of a Vertical Falling Film in the Presence of a First Order Exothermic Reaction**
P M J Trevelyan*, S Kalliadasis, J H Merkin and S K Scott
University of Leeds, UK

P24 **Density Fingering of Chlorite-Tetrathionate Fronts**
J Yang*, S Kalliadasis and A De Wit
University of Leeds, UK

P25 **Quenching of Flame Propagation with Heat Loss**
P L Simon*, S Kalliadasis, J H Merkin and S K Scott
University of Leeds, UK

P26 **Complex Oscillations in the Fed-Batch Reactor: A Work in Progress**
M L Davies*, S K Scott and I Schreiber
University of Leeds, UK

P27 **Dynamic Evolution of Flow Distributed Oscillations: The Movie**
J R Bamforth*, S K Scott, R Tóth and V Gáspár
University of Leeds, UK

** Denotes presenter of paper*

Skinner Prize for the Best Poster

The Skinner Prize will be awarded to an undergraduate or postgraduate student presenting a poster, who is a member of the RSC and whose poster is considered to be the best.

The winner will be announced at the Conference Banquet, on Tuesday 11 September.

Acknowledgements

The Royal Society of Chemistry and the Organising Committee wish to record their gratitude to UMIST as host to the conference, and Angela and Tony Fish Bequest for financial support.

Conference Banquet

The Conference Banquet will be held in Weston Room I, Weston Building at 19:30 on **Tuesday 11 September**.

19:00 – 19:30 Pre-dinner drinks in the Conservatory Bar

19:30 – 22:00 Banquet in Weston Room I

Faraday Discussions Volume

Those participants paying the full conference fees will receive a copy of the *Discussions Volume* about 6 months after the meeting. To expedite this, it is essential that summaries of contributions to the discussion are received no later than **19 September 2001** for questions and comments and **3 October 2001** for responses. In order to keep the student fees low the *Discussions Volume* is NOT included in the student conference fees. A copy of the publication may be purchased at less than half price, only for orders placed at the meeting; an application form will be made available at the meeting

Proposals for New Faraday Discussions

Proposals for new Faraday Discussions are always appreciated from members of the Faraday Division. They often arise through Subject Groups of the RSC but timely proposals from other groups are also gratefully received. Submissions from industrialists and those with close associations with industry are most welcome. There are three Faraday Discussions each year.

For further information please contact:

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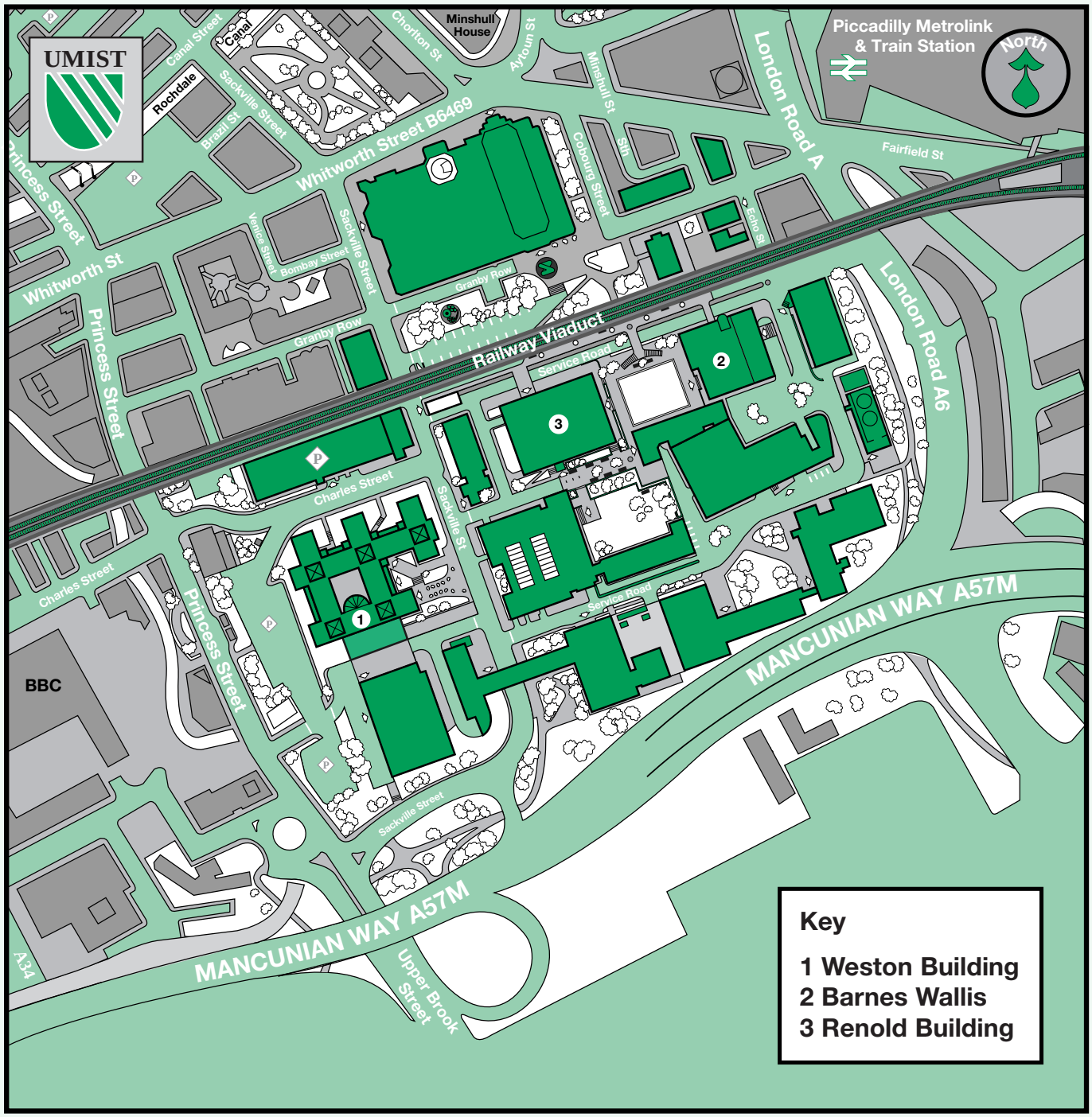

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