EXTENDED ABSTRACTS
(EA-22)

Dynamics in Small Confining Systems

Edited by

J. M. Drake, Exxon Research & Engineering Company
J. Klafter, Tel Aviv University
R. Kopelman, University of Michigan

Proceedings of Symposium M
1990 Fall Meeting of the Materials Research Society
November 26 - December 1, 1990
Boston, Massachusetts
Contents

PREFACE xi

*MELTING-FREEZING TRANSITIONS IN MOLECULARLY THIN LIQUID FILMS DURING SHEAR
Jacob Israelachvili, Michelle Gee, Patricia McGuiggan, Peter Thompson, and Mark Robbins 3

SHEAR THINNING OF HEXADECANE CONFINED BETWEEN MICA PLATES
George Carson, Hsuan-Wei Hu, and Steve Granick 7

*GEOMETRICAL CROSS-OVER, CORRELATION AND LOCAL DISORDER IN POROUS VYCOR GLASS AS REVEALED BY DIPOLAR ENERGY TRANSFER, SMALL ANGLE SCATTERING AND ELECTRON MICROSCOPY
P. Levitz and J.M. Drake 11

*LOCAL AND COLLECTIVE BEHAVIOR OF GEOMETRICALLY SUPERCOOLED FLUIDS
D.D. Awschalom 15

ON MEASUREMENT OF SOLVATION FORCES: COMPUTER SIMULATION AND THEORY
Mark Lupkowski and Frank van Swol 19

MOLECULAR FLOW IN A MODEL PORE SYSTEM
L.D. Howe, D.K. Ross, and A.J. Allen 23

*INTENSITY OSCILLATIONS FROM THE EQUILIBRATION OF BINARY FLUID MIXTURES IN A POROUS MEDIUM
W.I. Goldburg, E. To, J.S. Huang, and Y. Duan 27

SHIFTS IN THE CRYSTALLINE MELTING AND GLASS TRANSITION TEMPERATURES OF SMALL-MOLECULE ORGANICS CONFINED IN POROUS GLASSES
Catheryn L. Jackson and Gregory B. McKenna 31

WETTING TRANSITIONS IN A CYLINDRICAL PORE
A.J. Liu, C.J. Durian, E. Herbolzheimer, and S.A. Safran 35

*STATIC AND DYNAMIC PROPERTIES OF POLYMERS IN RANDOM ENVIRONMENTS
J. Machta and P. Le Doussal 39

DIFFUSION OF LINEAR POLYMER CHAINS IN CHEMICALLY IDENTICAL GELS
Č. Koňák, R. Bansil, S. Pajević, and J. Jakeš 41

*FLOW AND FREEZING IN MICROPOROUS SYSTEMS
Wen-Jong Ma, Mark Keller, Ronald L. Stanley, Jayanth R. Banavar, and Joel Koplik 45

*Invited Paper
EFFECT OF CONFINEMENT OF THE SOLID-LIQUID PHASE TRANSITIONS OF CYCLOHEXANE AND WATER IN POROUS KI AND KBr DISKS: A VIBRATIONAL APPROACH 47
R. Mu and V.M. Malhotra

LATERAL DIFFUSION OF LONG POLYMER CHAINS CONFINED IN AN ADSORBED LAYER 51
D. Frot, H. Hervet, P. Auroy, and L. Leger

*ARE THE LATTICE VIBRATIONS OF POROUS VYCOR DIFFERENT FROM THOSE OF BULK SILICA? 55
Susan K. Watson, David G. Cahill, and R.O. Pohl

NMR OF $^3$He ON SUBSTRATES AT VERY LOW TEMPERATURES 57
C.S. Zuo, Q.Q. Geng, and J.S. Waugh

*GEOMETRY AND DIFFUSION IN POROUS MEDIA 61
Lawrence M. Schwartz

*MICROSTRUCTURE AND DYNAMICS OF WATER IN POROUS GLASS 65
F. D'Orazio, S. Bhattacharja, and W.P. Halperin

DIELECTRIC DISPERSION MEASUREMENTS OF PARTIALLY SALT-WATER SATURATED POROUS GLASS 69
Espen Haslund and Bjarne Nøst

*COMPUTER SIMULATIONS OF FLUIDS IN ULTRA-THIN PORES 73
H.T. Davis, S.A. Somers, M. Tirrell, and I. Bitsanis

*COMPUTER STUDIES OF MOLECULARLY THIN CONFINED FILMS 77
D.J. Diestler, J.H. Cushman, and M. Schoen

CONVECTION AND DIFFUSION OF LARGE MOLECULES IN DISORDERED POROUS MEDIA 81
Muhammad Sahimi

*TRANSPORT OF FLUIDS IN MICROPOROUS MATERIALS 83
B. Abeles, L.F. Chen, J.W. Johnson, and J.M. Drake

BINARY LIQUID PHASE SEPARATION IN LENS PROTEIN SOLUTIONS 87
Michael L. Broide, Carolyn R. Berland, Jayanti Pande, Olutayo Ogun, and George B. Benedek

DIFFUSION IN MICROSTRUCTURED BLOCK COPOLYMER SOLUTIONS 89
N.P. Balsara, C.E. Eastman, M. Foster, T.P. Lodge, and M. Tirrell

THE CHARACTERIZATION OF POROUS SILICA GELS USING THE ELECTRON PARAMAGNETIC RESONANCE OF A NITROXIDE SPIN PROBE SOLUTION 93
J.G. Darab and R.K. MacCrone

STEADY-STATE SIMULATIONS OF CHEMICAL KINETICS IN LOW-DIMENSIONAL MEDIA: MOBILE AND IMMOBILE REACTANTS 97
L.W. Anacker and R. Kopelman

*Invited Paper
NONEXPONENTIAL POLYMER RELAXATION: DISTRIBUTIONS OF EVENT-TIMES FROM FLUORESCENCE DATA
Harald F. Kauffmann, Gerhard Landl, and Heinz W. Engl

SEgregation properties of an A + B → 0 reaction with initially separated components
Shlomo Havlin, Raoul Kopelman, Haim Taitelbaum, and George H. Weiss

Fractal structure of a crosslinked polymer resin. A small angle X-ray scattering, pulsed field gradient NMR and paramagnetic relaxation
J.-P. Korb and C. Chachaty

X-ray scattering studies of capillary wave fluctuations at liquid surfaces and in thin liquid films
Sunil K. Sinha, Milan K. Sanyal, K.G. Huang, and B.M. Ocko

Fracton dynamics in amorphous solids

Dynamics in the surface layer of thin polymer films
M. Toriumi, M. Yanagimachi, and H. Masuhara

Molecular model for the mechanical properties of elastomers
Yves Termonia

Size effects on pyrene excimer formation in a laser-trapped droplet
H. Misawa, M. Koshioka, K. Sasaki, N. Kitamura, and H. Masuhara

Saturation and segregation in reaction-limited chemical reactions: Exact results
E. Clément, P. Leroux-Hugon, and L.M. Sander

Characterization of self-segregation tendencies in two-component reacting systems on fractals
Shlomo Havlin, Raoul Kopelman, Rodney Schoonover, and George H. Weiss

Dielectric properties of micellar systems
S. Bhattacharya

Invited Paper
SOAP FILMS CONTAINING POLYMERS  
Sylvie Lionti-Addad and Jean-Marc Di Meglio 155

CRITICAL BEHAVIOR IN INVERSE MICELLE SYSTEMS  
J.P. Wilcoxon 159

THE EFFECT OF A CATION-COMPLEXING CRYPTAND ON THE SIZE AND SHAPE FLUCTUATIONS OF REVERSE AND DIRECT MICROEMULSION DROPLETS FORMED IN AOT-CONTAINING SYSTEMS  
L. Magid and B. Farago 163

DIFFUSION OF POLYMERS IN CROSS LINKED NETWORKS  

DIFFUSION-LIMITED PRECIPITATION WITH MULTIPLE CAPTURE SITES  
James P. Lavine 171

DYNAMIC HRTEM OBSERVATION OF STAGING TRANSITIONS AND INTERCALANT ISLAND BEHAVIOR IN INTERCALATION COMPOUNDS  
M. McKelvy, R. Sharma, E. Ong, G. Burr, and W. Glaunsinger 175

PERCOLATIVE BEHAVIOR IN CONDUCTING POLYMER BLENDS: POLY(3-HEXYLTHIOPHENE)/POLYSTYRENE  
M. Rabeony, J.M. Sowa, E. Berluche, S. Ramakrishnan, and D.G. Peiffer 179

HYBRIDIZATION OF THE ROTATIONAL STATE OF HD ON POROUS VYCOR GLASS  
T.E. Huber, J.A. Perez, and C.A. Huber 183

THE EFFECT OF HYDRODYNAMIC INTERACTIONS ON A TERMINALLY ANCHORED BEAD-ROD MODEL CHAIN  
R.S. Parnas and Y. Cohen 187

INCORPORATION OF METALLIC OXIDES IN POROUS VYCOR GLASS AND GLASS GELS  
D. Sunil, M.H. Rafailovich, J. Sokolov, H.D. Gafney, A. Hanson, B.J. Wilkens, and M.L. Denboer 191

SIMULATIONS OF DIFFUSION LIMITED A + B \rightarrow 0 REACTIONS: FINITE SIZE EFFECTS AND SCALING  
P. Argyrakis and R. Kopelman 195

CHEMICAL SEGREGATION IN A CAPILLARY  
Yong-Eun Koo and Raoul Kopelman 199

ENERGY TRANSFER FROM ORGANIC ADSORBATES TO DEFECT SITES IN SILICA SUPPORTS  
A.R. Leheny, N.J. Turro, and J.M. Drake 203

CHAOTIC FLOW IN POROUS MEDIA  
L.D. Howe, D.K. Ross, and A.J. Allen 207
LIQUIDUS BOUNDARIES OF THE GAMMA CRYSTALLIN LENS PROTEINS
Carolyn R. Berland, Michael L. Broide, Mamoru Kondo, Jayanti Pande, Olutayo Ogun, and George B. Benedek

TRAPPING REACTION KINETICS AND NEAREST-NEIGHBOR DISTRIBUTIONS ON LOW DIMENSIONAL AND FRACTAL LATTICES
R. Schoonover and R. Kopelman

HYDROGEN-DEUTERIUM EXCHANGE KINETICS ON SUPPORTED PLATINUM ISLANDS
Jeffrey Scott Hölder and Raoul Kopelman

EXCITON KINETICS STUDIES OF DISPERSED AGGREGATES: TRIPLET-TRIPLET FUSION IN NAPHTHALENE DOPED PMMA
Z-Y. Shi and R. Kopelman

NANOMETER CRYSTAL LIGHT SOURCES
W. Tan, R. Kopelman, K. Lieberman, and A. Lewis

THE RUPTURE OF THE TWO-DIMENSIONAL LENNARD-JONES FILM IN TENSION AND SHEAR MODES - A MOLECULAR DYNAMICS SIMULATION
Chun-Pok Leung and John F. Maguire

ADSORPTION OF PYRIDINE ON SILICA GELS
L. Nikiel and T.W. Zerda

EXPERIMENTAL AND THEORETICAL STUDY OF ANOMALOUS ACOUSTIC ABSORPTION IN A SOLIDIFYING POLYMER MELT
I.S. Graham, L. Fiché, and M. Grant

MESOSCOPIC DIMENSIONALITY-DOMINANCE IN OSTEASIBLY SIZE-INDUCED METAL-INSULATOR TRANSITIONS (SIMIT) IN METALLIC-CONDUCTOR ISOLATED FINE-PARTICLES: DIMENSIONAL-CALCULUS OF DIMENSION-THEORY DERIVATION OF SYNERGETICS PARADIGM & DICHOTOMY "COMMON FUNCTIONING PRINCIPLE": DIMENSIONALITY-INDUCED METAL-INSULATOR TRANSITIONS (DIMITS): RELATION TO POSSIBLE NARROW-CHANNEL OXIDIZED POLYPROPYLENE T_c ≥ 300°K. "SUPER" HYPER-CONDUCTIVITY
Edward Siegel

AUTHOR INDEX