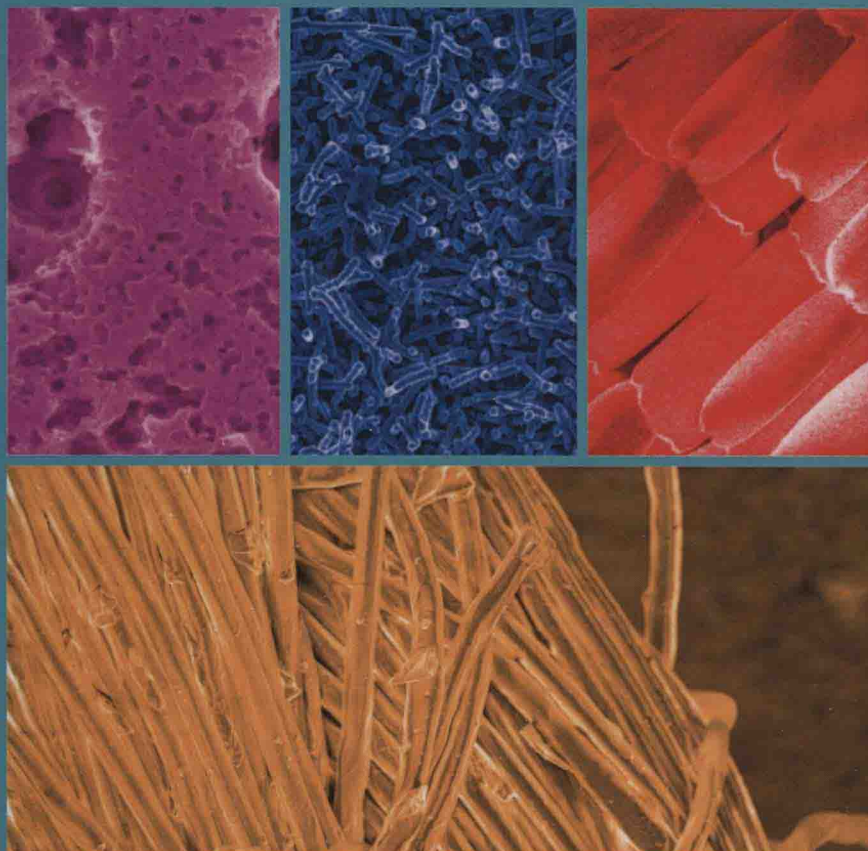


Volume 2

The Chemistry and Physics of Engineering Materials

Limitations, Properties, and Models



Editors

Alexandr A. Berlin, DSc | Roman Joswik, PhD | Nikolai I. Vatin, DSc

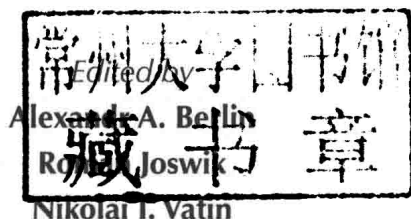
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THE CHEMISTRY AND PHYSICS OF ENGINEERING MATERIALS

Volume 2

Limitations, Properties, and Models

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LIST OF ABBREVIATIONS

ADH	adipic dihydrazide
ART	activation-relaxation technique
ATNMRI	Advanced Technologies and New Materials Research Institute
BET	Brunauer–Emmett–Teller
BGK	Bhatnagar-Gross-Krook
BKS	van Beest, Kramer and van Santen
BMH	Born–Mayer–Huggins
BSA	bovine serum albumin
CA	chitosan
CNT	classical nucleation theory
DLCA	diffusion-limited cluster–cluster aggregation
DMC	dynamic Monte Carlo
ECM	extracellular matrix
EDP	electric desalting plant
FENE	finitely extensible nonlinear elastic
FSSE	first shell substitution effect
GAG	glycosaminoglycan
GNC	globular nanocarbon
HA	hyaluronic acid
HCl	hydrochloridric acid
HMDS	hexamethyldisilazane
HRTEM	high resolution transmission electron microscopy
HYAL	hyaluronidase
LAAO	limited access of atmospheric oxygen
LDPE	low density polyethylene
MBA	1-methyl-2-butenyl-aniline
MC	Monte Carlo
MD	molecular dynamics
MFI	melt flow index

PCCM	polycondensation capable monomers
PCT	physical and chemical transformations
PDF	pair distribution function
PEI	polyethyleneimine
PLL	poly-L-lysine
PP	polypropylene
RCP	random close packing
ROS	reactive oxygen species
SAIA	Slovak Academic Information Agency
SANS	small-angle neutron scattering data
SEM	scanning electron microscopy
SF	synovial fluid
SR	sustained release
THz	terahertz
TM	technical materials
TMOS	tetramethoxysilane
UHMPE	ultrahigh molecular polyethylene
VACF	velocity autocorrelation function

LIST OF SYMBOLS

a	Acceleration of particle
A	Atom-type dependent constants
B	Strength of the three-body interaction
b_0	Ideal bond length
C_{ik}	Constants
D	Effective dielectric function
d_f	Fractal dimension, d_f , of porous systems
E	Potential energy
E_{kin}	Kinetic energy
F	Force
H	Hamiltonian
H	Strength
H_{ij}	Strength
k_B	Boltzmann constant, 1.3806×10^{-23} J/K
K_b	Force constant for bound atoms
K_θ	Force constant for bond angles theta
m	Mass of particle
M	Total sampling number
N	Number of atoms
P	Momentum
q	Atomic charges
r	Distance between two atoms
S	Entropy
T	Temperature
t	Time
$u(r^N)$	Potential energy
V	Potential
v	Velocity
x	Direction
Z_i	Formal ionic charges
Δt	Time interval

Greek Symbols

ϕ_{ijkl}	Torsion angles
θ_{ijk}	Band angel
ϕ_{LJ}	Lennard-Jones potential
α	Electric polarizability
ε	Energy
ε_0	Permittivity of free space
η	Exponent of steric repulsion
η_{ij}	Exponent of steric repulsion
θ	Angle between the vector position of the atoms
ρ	Density
σ	Length parameters
τ	Relaxation time

PREFACE

The collection of topics in the two-volume publication reflects the diversity of recent advances in this field with a broad perspective which may be useful for scientists as well as for graduate students and engineers. This new book presents leading-edge research from around the world in this dynamic field.

Diverse topics published in this book are the original works of some of the brightest and most well-known international scientists in two separate volumes.

In the first volume, modern analytical methodologies are presented here.

The first volume offers scope for academics, researchers, and engineering professionals to present their research and development works that have potential for applications in several disciplines of engineering and science. Contributions range from new methods to novel applications of existing methods to provide an understanding of the material and/or structural behavior of new and advanced systems.

In the second volume, limitations, properties and models are presented. These two volumes:

- are collections of articles that highlight some important areas of current interest in recent advances in chemistry and physics of engineering materials
- give an up-to-date and thorough exposition of the present state-of-the-art of chemical physics
- describe the types of techniques now available to the chemist and technician, and discuss their capabilities, limitations and applications.
- provide a balance between chemical and material engineering, basic and applied research.

We would like to express our deep appreciation to all the authors for their outstanding contributions to this book and to express our sincere gratitude for their generosity. All the authors eagerly shared their experiences and expertise in this new book. Special thanks go to the referees for their valuable work.

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