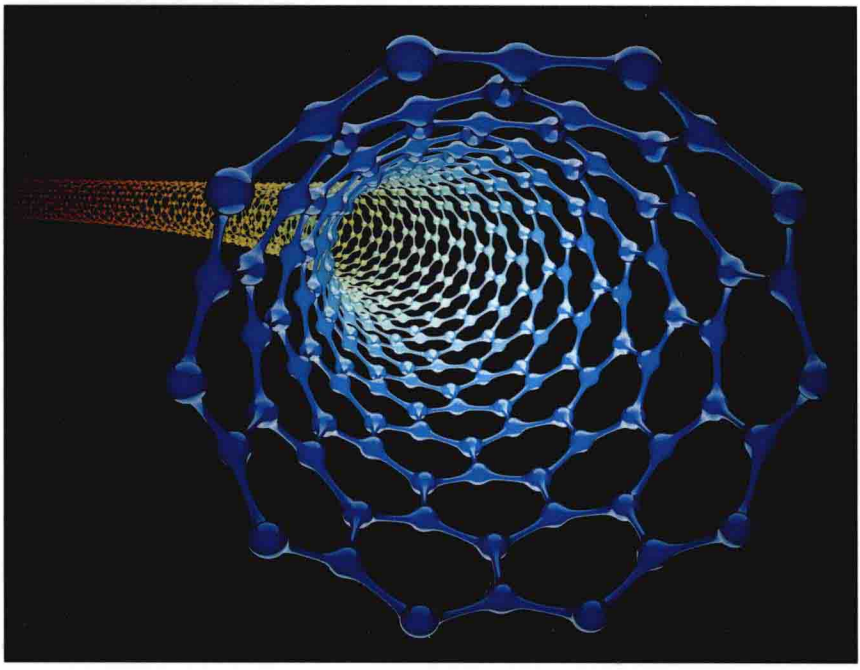
MECHANICAL and PHYSICO-CHEMICAL CHARACTERISTICS of MODIFIED MATERIALS

Performance Evaluation and Selection



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LIST OF ABBREVIATIONS

2D	two-dimensional
3D	three-dimensional
BBF	best bin first
CAD	computer-aided design
CCD	charged coupled device
CM	Chamfer matching
CMT	correct-match rate
DCM	directional chamfer matching
DLT	direct linear transform
DOF	degrees of freedom
DoG	difference of Gaussians
DSM	digital surface models
DTCWT	dual-tree complex wavelet transforms
EBR	edge-based regions
EBSD	electron backscatter diffraction
ENMs	electrospun nanofibrous membranes
ESM	efficient second-order minimization method
FN	false negatives
FP	false positives
GIS	geographic information system
GLOH	gradient location and orientation histogram
GSD	ground sampling distance
HD	Hausdorff distance
HOG	histogram of oriented gradient
IBR	intensity-extrema-based
LMS	least median of squares
LoG	Laplacian of Gaussian
LSCM	laser scanning confocal microscope
Micro-CT	micro computed tomography
MSER	maximally stable extremal regions

NN	nearest neighbors
OD	optic disk
PCA	principal component analysis
POA	pore open area
QMF	quadrature mirror filter
SEM	scanning electron microscopy
SIFT	scale invariant feature transform
SSD	sum of squared differences
SURF	speeded up robust features
SVD	singular value decomposition of a matrix
TN	true negatives
TP	true positives
TPR	true positive rate
VP	vanishing point
WDST	windowed discriminant spectral template

LIST OF SYMBOLS

ε	porosity
V_s	volume of sample
V_p	pore volume
K_{KC}	Kozeny-Carman predicted permeability, mD
c	a constant
d	median grain size diameter, microns
P_n	projective space (n-dimensions)
A_n	affine Space (n-dimensions)
R^{n+1}	vector space
$X = [X_1, X_1, ..., X_{n+1}]^T$	homogeneous coordinates
L	line in projective space
π	plane in projective space
S^2	2D sphere
$f(x) = Ax + b$	affine transformations
A	square matrix
b	translation matrix
$G(x, \sigma\%)$	Gaussian matrix
C	Harris detector matrix
λ	Eigen values
$\sigma\%$	natural scale
H	Hessian matrix
I	image
I_{xx}, I_{yy}, I_{xy}	second order derivatives of image intensity
$f(x, y)$	two-dimensional image function
$*$	discrete convolution
$g(x, y)$	filter kernel
x–y	direction of a Guassian
$M(x, y)$	image gradient magnitude
$Q(x, y)$	image orientation
$h_{r(l,m)}(k)$	Gradient magnitude

c_k	orientation bin center
Δ_k	orientation bin width
$H(X,\sigma)$	Hessian matrix
$L_{xx}(X,\sigma)$	convolution of the Gaussian second order derivative
$H(C)$	finite energy
ρ_b	DTCWT coefficients
α and β	scaling coefficients
g_k	individual feature in gist descriptor
$w_k(x, y)$	A spatial window
m_{ij}	distance ground between pairs of features across the two images
c_{ij}	cost of matching these two points
$h_i(k)$, $h_j(k)$	K-bin normalized histogram at pi and qj
$H(A, B)$	Hausdorff distance
$S = \{S_1 = \pm 1, ..., s_N\}$	binary sequences
$d_{CM}(U,V)$	chamfer distance between U and V
$W(x,s)$	a warping function
t_x, t_y	translations along x and y axis
$\hat{s}$	alignment parameter
$\varphi(x)$	direction term
λ	a weighting factor between location and orientation terms
$H(M,R)$	Hausdorff distance between M and R (M and R are reference feature points and image feature points)
$\|\|\ \|\|$	distance between two points
$K^{th}_{a[A}$	K^{th} ranked value of $d_B(a)$
$d_B(a)$	minimum distance value at point a to the point set B
$Q^{h}_{b[B}$	K^{th} ranked value of the Euclidean distance set
$P^{th}_{a[A}$	P^{th} ranked value of $Q^{h}_{b[B}\|\|a–b\|\|$
NE	size of the Euclidean distance
p*	true nearest neighbor
$M = [X, Y, Z]^T$	a 3D point
$m\%$	homogeneous coordinate vector of vector m

K	camera calibration matrix
e_1, e_2	epipoles
l_1, l_2	epipolar lines
U, V	orthogonal 3×3 matrices
Σ	3×3 diagonal matrix
R	rotation matrix
H	homogeneous matrix
E	essential matrix
F	fundamental matrix
N	number of iterations
[	probability that a sample correspondence
Q_i	rotation vector
$P_i\%P_j\%$	camera rays
t_{ij}	translation vector between camera centers

PREFACE

Understanding chemical and solid materials and their properties and behavior is fundamental to chemical design and engineering design and is a key application of chemicals and materials science. Written for all students of chemical science and mechanical engineering and materials science and design, this book describes the procedures for material selection and design in order to ensure that the most suitable materials for a given application are identified from the full range of materials, chemicals, and section shapes available.

Several case studies have been developed to further illustrate procedures and to add to the practical implementation of the text.

This new volume reviews recent academic and technological developments behind new engineered modified materials. The book is intended for researchers and those interested in future developments in mechanical and physico-chemical characteristics of modified materials. Several innovative applications for different materials are described in considerable detail with emphasis on the experimental data that supports these new applications. From fibers to chemical materials and from membranes to ceramics, creative modifications concerning new composites are described that could one day become commonplace. Never before has this much new information materials modification been packaged into one volume. In this book the world's leading experts describe their most recent research in their areas of expertise. The book will also be a useful tool for students and researchers, providing helpful insights into new evolving research areas in mechanical and physico-chemical characteristics of modified materials.