

**High-temperature structural materials**

A Discussion organized and edited by R. W. Cahn, A. G. Evans  
and M. McLean

**M. MCLEAN**

Nickel-base superalloys: current status and potential

**J. C. WILLIAMS**

Materials requirements for high-temperature structures in the 21st century

**M. F. ASHBY & C. A. ABEL**

Materials selection to resist creep

**M. KNECHTEL, N. CLAUSSEN & J. RÖDEL**

Reliability of structural ceramics

**R. R. NASLAIN**

Ceramic matrix composites

**R. W. CAHN**

Multiphase intermetallics

**A. G. EVANS**

Ceramics and ceramic composites as high-temperature structural materials:  
challenges and opportunities

**D. NGUYEN MANH, A. M. BRATKOVSKY & D. G. PETTIFOR**

Quantum mechanical predictions in intermetallics modelling

**N. SAUNDERS**

Phase diagram calculations for high-temperature structural materials

**M. RAPPAZ & CH.-A. GANDIN**

Process modelling and microstructure

**B. F. DYSON**

Mechanical testing of high-temperature materials: modelling data-scatter

**T. J. LU & J. W. HUTCHINSON**

Effect of matrix cracking on the overall thermal conductivity of fibre-reinforced  
composites

**F. A. LECKIE**

High-temperature mechanism-based design

Series A Volume 450 Number 1938 8 July 1995

## CONTENTS

D. NGUYEN & V. BALAKOTAIAH	pages 1–21
Reaction-driven instabilities in down-flow packed beds	
Z. Z. WU, H. DAVIS & S. K. BATRA	23–36
Correct ray-tracing analysis for interference microscopy of fibres	
D. HARRIS	37–49
A unified formulation for plasticity models of granular and other materials	
J. H. HANNAY	51–65
Path-linking interpretation of Kirchhoff diffraction †	
J.-M. CLARISSE, J. N. NEWMAN & F. URSELL	67–87
Integrals with a large parameter: water waves on finite depth due to an impulse †	
B. ZHANG & I. D. ABRAHAMS	89–108
The radiation of sound from a finite ring-forced cylindrical elastic shell. I. Wiener–Hopf analysis †	
F. FRANCHI & B. STRAUGHAN	109–121
Effects of errors in the initial-time geometry on the solution of an equation from dynamo theory in an exterior domain †	
M. F. ASHBY, L. J. GIBSON, U. WEGST & R. OLIVE	123–140
The mechanical properties of natural materials. I. Material property charts †	
L. J. GIBSON, M. F. ASHBY, G. N. KARAM, U. WEGST & H. R. SHERCLIFF	141–162
The mechanical properties of natural materials. II. Microstructures for mechanical efficiency. †	
P. S. P. COWPERTWAIT	163–175
A generalized spatial-temporal model of rainfall based on a clustered point process †	
N. N. LJEOPOJEVIC & R. G. FORBES	177–192
Variational thermodynamic derivation of the formula for pressure difference across a charged conducting liquid surface and its relation to the thermodynamics of electrical capacitance †	
G. N. MERCER & R. O. WEBER	193–198
Combustion wave speed †	
S. K. SCOTT & J. D. B. SMITH	199–217
Modelling of ignition of flammable atmospheres by radiation-heated fibrous agglomerates †	
C. J. CHRISTOPHER & N. G. LLOYD	219–224
Polynomial systems: a lower bound for the Hilbert numbers †	

† These papers were produced from the authors' disks by using the T<sub>E</sub>X typesetting system.