

Contents

Preface XI

SCIENCE OF SOL-GEL PROCESSING

STRUCTURE OF SOLUBLE SILICATES	1
D. W. Schaefer and K. D. Keefer	
THE EFFECT OF HYDROLYSIS CONDITIONS ON THE STRUCTURE AND GROWTH OF SILICATE POLYMERS	15
K. D. Keefer	
A COMPARISON BETWEEN THE DENSIFICATION KINETICS OF COLLOIDAL AND POLYMERIC SILICA GELS	25
C. J. Brinker, W. D. Drotning, and G. W. Scherer	
EFFECT OF WATER ON ACID- AND BASE-CATALYZED HYDROLYSIS OF TETRAETHYLOXOSILICATE (TEOS).	33
L. C. Klein and G. J. Garvey	
GEL STRUCTURES IN LEACHED ALKALI SILICATE GLASS	41
B. C. Bunker, T. J. Headley, and S. C. Douglas	
THE PROCESSING AND CHARACTERIZATION OF DCCA MODIFIED GEL-DERIVED SILICA	47
S. Wallace and L. L. Hench	
STRENGTH OF GEL-DERIVED SiO ₂ FIBERS	53
W. C. LaCourse	
THE CERAMIST AS CHEMIST - OPPORTUNITIES FOR NEW MATERIALS	59
D. R. Uhlmann, B. J. J. Zelinski and G. E. Wnek	
PROCESSING AND PROPERTIES OF SOL-GEL 20 MOL% Na ₂ O-80 MOL% SiO ₂ (20N) MATERIALS	71
S. H. Wang and L. L. Hench	
PHYSICAL-CHEMICAL VARIABLES IN PROCESSING Na ₂ O - B ₂ O ₃ -SiO ₂ GEL MONOLITHS	79
G. OrceI and L. L. Hench	
THE ROLE OF WATER IN DENSIFICATION OF GELS	85
T. A. Gallo, C. J. Brinker, L. C. Klein and G. W. Scherer	
FORMATION OF GLASS AND AMORPHOUS OXIDE FIBERS FROM SOLUTION.	91
S. Sakka	

ENVIRONMENTAL EFFECTS IN GEL DERIVED SILICATES	101
L. L. Hench	
GELS AND GEL-DERIVED GLASSES IN THE SiO_2 GeO_2 SYSTEM	111
S. P. Mukherjee	
SUPER-AMORPHOUS ALUMINA GELS	119
A. C. Pierre and D. R. Uhlmann	

APPLICATIONS OF SOL-GEL PROCESSING

STRUCTURE AND PROPERTIES OF VANADIUM PENTOXIDE GELS.	125
J. Livage	
THE ROLE OF GEL PROCESSING IN THE PREPARATION OF CATALYST SUPPORTS.	135
J. A. Cairns, D. L. Segal, and J. L. Woodhead	
ELECTRICAL PROPERTIES OF $\text{Na}_2\text{O} - \text{SiO}_2$ DRIED GELS.	139
D. Ravaine, J. Traore, L. C. Klein, and I. Schwartz	
PREPARATION OF THIN COMPOSITE COATINGS BY SOL-GEL TECHNIQUES	145
J. Martinsen, R. A. Figat, and M. W. Shafer	
DESIGN AND SYNTHESIS OF METAL-ORGANIC PRECURSORS TO ALUMINOSILICATES.	151
A. G. Williams and L. V. Interrante	
PREPARATION OF BARIUM TITANATE FILMS USING SOL-GEL TECHNIQUES.	157
R. G. Dosch	
RHEOLOGICAL PROPERTIES OF AN ALKOXIDE DERIVED HLW SLURRY FEED	163
L. H. Cadoff, D. Smith-Magowan, D. E. Harrison, and J. M. Pope	
FERROELECTRIC CERAMICS--THE SOL-GEL METHOD VERSUS CONVENTIONAL PROCESSING.	169
E. Wu, K. C. Chen, and J. D. Mackenzie	

CHEMICAL SYNTHESIS OF CERAMIC POWDERS

CHEMICAL SYNTHESIS OF SINGLE AND MIXED PHASE OXIDE CERAMICS.	175
K. S. Mazdhyasni	

SYNTHESIS, CHARACTERIZATION AND PROCESSING OF MONOSIZED CERAMIC POWDERS.	187
B. Fegley, Jr. and E. A. Barringer	
LEAD ZIRCONATE-LEAD TITANATE (PZT) CERAMICS FROM ORGANIC-DERIVED PRECURSORS	199
R. G. Dosch	
GLASSES AND CERAMICS FROM COLLOIDS	205
G. W. Scherer	
AVOIDING CERAMIC PROBLEMS BY THE USE OF CHEMICAL TECHNIQUES	213
P. E. D. Morgan	
PRECURSOR CHEMISTRY EFFECTS ON DEVELOPMENT OF PARTICULATE MORPHOLOGY DURING EVAPORATIVE DECOMPOSITION OF SOLUTIONS.	227
T. J. Gardner, D. W. Sproson, and G. L. Messing	
AN INFRARED STUDY OF METAL ISOPROPOXIDE PRECURSORS FOR SrTiO_3	233
R. E. Riman, D. M. Halland, C. J. Northrup, Jr., H. K. Bowen, and A. Bleier	
PREPARATION OF STRONTIUM TITANATE CERAMICS AND INTERNAL BOUNDARY LAYER CAPACITORS BY THE PECHINI METHOD	239
K. D. Budd and D. A. Payne	
PREPARATION AND OPTICAL PROPERTIES OF POLYCRYSTALLINE ALUMINUM GERMANATE.	245
S. Prochazka and G. A. Slack	
<u>CHARACTERIZATION OF GELS AND POWDERS</u>	
CHEMICAL ANALYSES OF SOL/GEL SURFACES AND THIN FILMS.	255
C. G. Pantano, C. A. Houser and R. K. Brow	
IN SITU FT-IR STUDIES OF OXIDE AND OXYNITRIDE SOL-GEL-DERIVED THIN FILMS	267
D. M. Haaland and C. J. Brinker	
STRUCTURE DATA FROM LIGHT SCATTERING STUDIES OF AEROGEL.	275
A. J. Hunt and P. Berdahl	
CHARACTERISATION OF CONCENTRATED COLLOIDAL SUSPENSIONS FOR CERAMIC PROCESSING.	281
R. F. Stewart and D. Sutton	
THE PYROLYTIC DECOMPOSITION OF OWENS-ILLINOIS RESIN GR650, AN ORGANOSILICON COMPOUND.	287
B. G. Bagley, P. K. Gallagher, W. E. Quinn and L. J. Amos	

MICRO-RAMAN SPECTROSCOPY OF FRESH AND AGED SILICA GELS.	293
L. C. Klein, C. Nelson, and K. L. Higgins	
¹ H NMR STUDIES OF THE SOL-GEL TRANSITION	301
R. A. Assink and B. D. Kay	
EFFECT OF AGING ON ELECTROPHORETIC BEHAVIOR OF SOL-GEL DERIVED ALUMINAS	307
B. I. Lee and L. L. Hench	
NONAQUEOUS SUSPENSION PROPERTIES OF Al ₂ O ₃ AND SILICATE GLASS POWDERS.	313
M. D. Sacks and M. I. Alam	
MICROSTRUCTURAL TRANSFORMATIONS IN ALUMINA GELS.	321
F. W. Dynys, M. Ljungberg and J. W. Halloran	

NOVEL MATERIALS THROUGH CHEMICAL SYNTHESIS

ORGANICALLY MODIFIED SILICATES BY THE SOL-GEL PROCESS.	327
H. Schmidt	
PROCESSING OF ADVANCED CERAMIC COMPOSITES.	337
R. W. Rice	
MULTI-PHASIC CERAMIC COMPOSITES MADE BY SOL-GEL TECHNIQUE	347
R. Roy, S. Komarneni, and D. M. Roy	
COMPOSITION AND CHEMICAL STRUCTURE OF NITRIDED SILICA GEL	361
R. K. Brow and C. G. Pantano	
SOL-GEL DERIVED CERAMIC-CERAMIC COMPOSITES USING SHORT FIBERS.	369
J. J. Lannutti and D. E. Clark	
LONG FIBER REINFORCED SOL-GEL DERIVED Al ₂ O ₃ COMPOSITES.	375
J. J. Lannutti and D. E. Clark	
THERMAL REACTION OF SILANE WITH ACETYLENE AND THE THERMAL DECOMPOSITION OF ETHYNYLSILANE	383
M. A. Ring, H. E. O'Neal, J. W. Erwin, and D. S. Rogers	
POLYSILANES AS POSSIBLE PRECURSORS TO SILICON CARBIDE	387
R. West and R. Sinclair	
Author Index	391
Subject Index	393