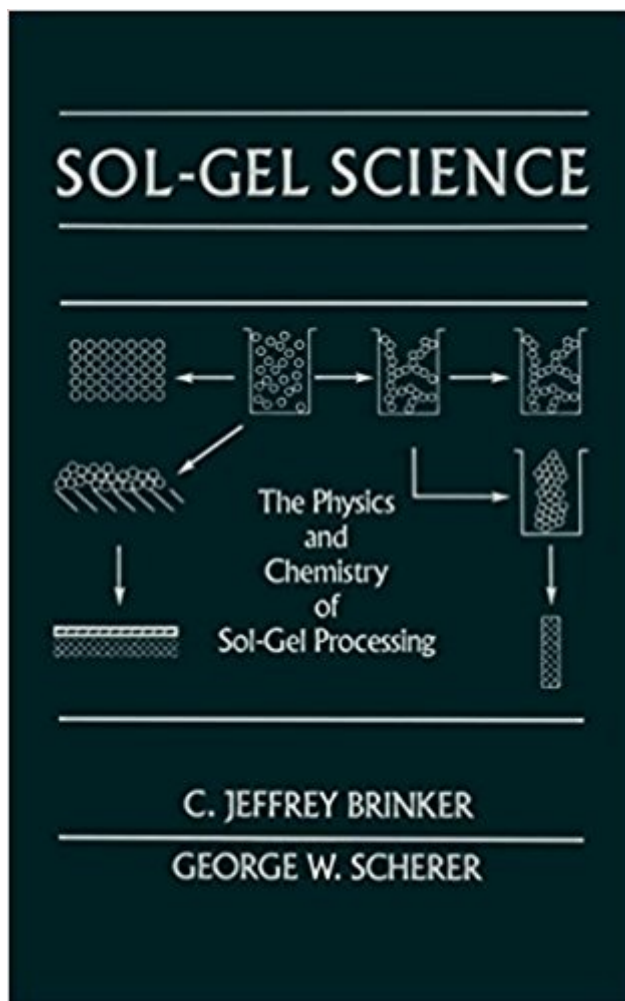


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# Sol-Gel Science: The Physics And Chemistry Of Sol-Gel Processing



## Synopsis

Sol-Gel Science: The Physics and Chemistry of Sol-Gel Processing presents the physical and chemical principles of the sol-gel process. The book emphasizes the science behind sol-gel processing with a chapter devoted to applications. The first chapter introduces basic terminology, provides a brief historical sketch, and identifies some excellent texts for background reading. Chapters 2 and 3 discuss the mechanisms of hydrolysis and condensation for nonsilicate and silicate systems. Chapter 4 deals with stabilization and gelation of sols. Chapter 5 reviews theories of gelation and examines the predicted and observed changes in the properties of a sol in the vicinity of the gel point. Chapter 6 describes the changes in structure and properties that occur during aging of a gel in its pore liquor (or some other liquid). The discussion of drying is divided into two parts, with the theory concentrated in Chapter 7 and the phenomenology in Chapter 8. The structure of dried gels is explored in Chapter 9. Chapter 10 shows the possibility of using the gel as a substrate for chemical reactions or of modifying the bulk composition of the resulting ceramic by performing a surface reaction (such as nitridation) on the gel. Chapter 11 reviews the theory and practice of sintering, describing the mechanisms that govern densification of amorphous and crystalline materials, and showing the advantages of avoiding crystallization before sintering is complete. The properties of gel-derived and conventional ceramics are discussed in Chapter 12. The preparation of films is such an important aspect of sol-gel technology that the fundamentals of film formation are treated at length in Chapter 13. Films and other applications are briefly reviewed in Chapter 14. Materials scientists and researchers in the field of sol-gel processing will find the book invaluable.

## Book Information

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## Customer Reviews

C. Jeffrey Brinker is widely recognized for his pioneering work in sol-gel chemistry - the formation of ceramic materials from molecular precursors. His initial efforts addressed the processing of highly refractory glasses like fused silica at remarkably low temperatures - less than half that of conventional melt-processing. He then turned his attention to the preparation of porous materials useful for a wide range of applications including antireflective coatings, sensors, membranes, adsorbents, and thermal and acoustic insulation. Through exploitation of the scaling relationships of mass and size of fractal objects, he devised a fractal engineering approach to tailor the porosity and pore size of these materials. This early work culminated in the publication of *Sol-Gel Science* in 1990 (with co-author George Scherer), a book that remains the most highly cited reference in this rapidly growing field. From 1974 to 1985, Professor George W. Scherer was at Corning Glass Works, where his research included optical fiber fabrication, viscous sintering, and viscoelastic stress analysis. The latter work was the subject of his first book, *Relaxation in Glass and Composites* (Wiley, 1986). From 1985 through 1995, he was a member of the Central Research Department of the DuPont Company, where his work dealt principally with sol-gel processing, and especially with drying. In collaboration with Jeff Brinker of Sandia National Labs, he wrote a book entitled *Sol-Gel Science* (Academic Press, 1990). He is a fellow of the American Ceramic Society and a member of the Materials Research Society, the American Society of Civil Engineers, the American Concrete Institute, and RILEM. In 1997 he was elected to the National Academy of Engineering. In February, 1996, he became a full professor in the Department of Civil & Environmental Engineering at Princeton University, and a member of the Princeton Materials Institute (now, PRISM). His research involves mechanisms of deterioration of concrete and stone, particularly by crystallization of ice and salts in the pores.

The book printing as expected is good . But the adhesion of the hardcover is bad

Great technical book

Photocopied from the original one.

for Tina , tell a lot of the product . This is wonderful.....very sharp and feels good in my hand. I just used it for the first time yesterday and it will be my favorite product. It arrived quickly and in great condition. It is a very handsome product. it is recommend. so fast, receive it next day .

Perhaps it's trite to say this, but Brinker and Scherer's *Sol Gel Science* is \*the\* indispensable desktop reference for the sol-gel chemist. Though now over a decade old, the topics covered (only a smattering of which are mentioned in the editorial review above) are so fundamental that it remains one of the most often cited sol-gel references, both in texts and refereed journal articles. The layout of the book takes the reader through the entire sol-gel formation process, from reaction to casting to drying, curing and other post-modifications, with a chapter devoted to each step - permitting this book either to be read cover-to-cover (for the interested newcomer or as a text for a course in sol-gel science) or to be referenced as necessary by the more familiar reader. C. Jeffrey Brinker, now affiliated with Sandia National Laboratories as well as the University of New Mexico, remains the preeminent researcher and one of the most-often cited authors in his field, continuing research on self-assembled nanostructures, porosity-tailored materials, organic-inorganic hybrids, and related topics. George W. Scherer, professor in the Civil and Environmental Engineering Department of Princeton University, also maintains a professional involvement in sol-derived gels, glasses, and ceramics, among other areas of interest, and is the author of several patents, as well as innumerable scientific papers, in these fields. Though more-recent texts may be more up-to-date in terms of research cited, especially areas pertinent to nanotechnology, this book's position as a compendium of knowledge in the field of sol-gel science has not diminished with age and is highly recommended.

great book.

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