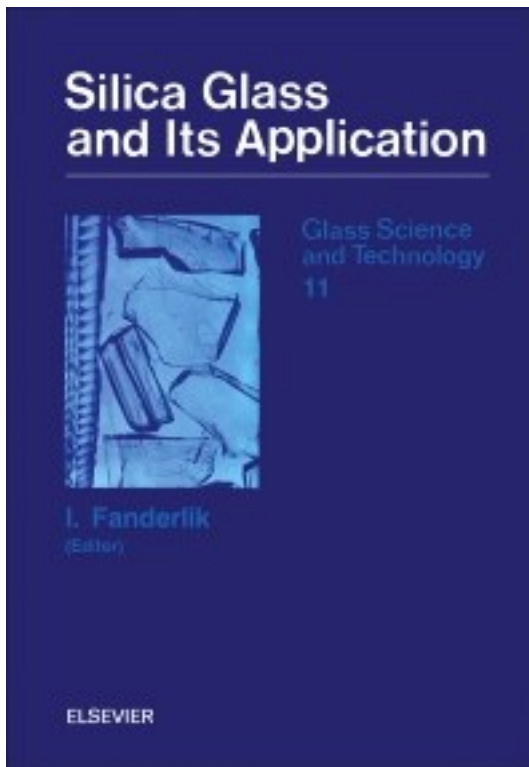


# silica glass and its application



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In terms of chemical composition, silica glass is the simplest amorphous substance that has been commercially utilized in many fields of application in a number of industrial branches, thanks to its physico-chemical properties.

The present volume gives a comprehensive overview on the latest developments in glass technology. The influence of genetic types of raw materials on the choice of melting technology is discussed. Phase transformations of quartz-silica glass and the influence of the impurities of melting furnaces and furnace material is examined. The

quartz raw materials suitable for the manufacture of clear, opaque and synthetic silica glasses, various manufacturing processes, the physico-chemical properties of silica glasses and their utilization in technological practice are reviewed in detail.

The book provides a wealth of detailed information on the properties and use of silica glass which will be of considerable interest to workers in the glass industry, including those in research and development, as well as to people in the fields of electronics, electrical engineering, communication technology, optics and the chemical, power engineering and metallurgical industries. It will also be a useful information supplement on the properties and applications of silica glass for students in technical schools and universities.

作者介绍:

State Glass Research Institute, Czechoslovakia

目录: 1. Significance and Classification of Silica Glasses.

2. Raw Materials for Silica Glass Manufacture.

Introduction. Natural raw materials. The structure and properties of crystalline silica. Condition for the formation of quartz. Rock crystal deposits. Vein quartz deposits. Quartz sand. Synthetic raw materials. Raw materials for the sol-gel method of silica glass production. Raw materials for the production of silica glass by thermal decomposition of silicon compounds. Methods for the evaluation of natural quartz raw materials. Density characteristics. Quartz-cristobalite phase conversion. Chemical analysis. Mineralogical analysis. Sieve analysis. Evaluation of the distribution of impurities. Light transmittance measurement. Light scattering measurement. Other supplementary methods.

3. The Technology of Silica Glass Manufacture.

Silica glass. The quartz to silica glass phase transformation. Liberation of gaseous components during the heating of quartz. The effect of admixtures and accompanying minerals on the formation of silica glass. The effects of furnace atmosphere and furnace materials on the formation of silica glass. Reactions of synthetic raw materials. Thermodynamics aspects of the formation of silica glass. Structure of silica glass. Refining of natural quartz raw materials for the production of silica glass. Basic refining processes for the quartz raw materials. Methods of refining the quartz raw materials. Evaluation of refining methods. Technological methods of manufacture of silica glass. Opaque silica glass. Clear silica glass. Optical silica glass. Special methods of silica glass manufacture. Manufacture of Vycor type extractable glasses.

4. Physical and Chemical Properties of Silica Glasses.

Chemical properties. Chemical composition. Resistance to water and aqueous solutions of salts. Durability with respect to acids. Durability with respect to alkalis. Durability with respect to other agents. Mechanical properties. Density. Modulus of elasticity and Poisson ratio. Strength of silica glass. Hardness. Propagation of sound waves. Thermal properties. Thermal expansivity. Resistance to thermal shock. Viscosity. Specific heat. Thermal conductivity. Permeability to gases. Surface tension. Crystallization properties. Electrical properties. Electrical resistivity. Electrical disruptive strength. Permittivity. Loss factor  $\tan \delta$ . Optical properties. Reflection of radiation by silica glass. Optical refraction and dispersion by silica glass. Absorption of radiation by silica glass. Scattering of radiation by silica glass. Luminescence of silica glass. Resistance of silica glasses to the effects of radiation. Photoelasticity constant.

5. Application of Silica Glasses in Practice.

Lighting technology. Semiconductor technology. Optical industry. Glass industry.

Chemical industry and instruments. Metallurgy. Electrical engineering, electronics and communication technology. Astronomy and space research.

References.

Subject Index.

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## 标签

工程技术

## 评论

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