**DIRECT SY NTHESIS OF ORGANOCHLOROSILANES: 70 YEARS OF GNIIChTEOS**

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**Keywords**: methylchlorosilanes, chlorosilanes, methyl chloride, direct synthesis, synthesis reactor.

The article briefly describes the activities of one of the leading laboratories of GNIICHTEOS engaged in the study of the direct synthesis of organosilicon monomers and the development of advanced technology for large-scale commercial production of chloro- and organochlorosilanes. On the example of methylchlorosilanes manufacturing the main stages of development of the silicone industry in the USSR and the Russian Federation are shown, and the leading role of GNIIChTEOS researches in this development is emphasized. We have looked upon the design of methylchlorosilanes synthesis reactors used in the Soviet Union, the Russian Federation and developed at GNIIChTEOS for China. General description of the methylchlorosilanes direct process is presented for information. The most advanced achievements of GNIIChTEOS in the area of methylchlorosilanes production include the setup of new production facility in Kazan. The article gives a brief description of the newly constructed plant.

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**ORGANOSILICON MATERIALS OF RAPID CURING: HISTORY OF TREND DEVELOPMENT**

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**Keywords**: rapid curing compositions, oligovinylorganosiloxanes, hydrideoligoorganosiloxanes, SiEL compounds, STYK compounds, endo- and exo prostheses, intraocular lenses , fiber-optic waveguides.

The development history of rapid curing organosilicon compositions that were elaborated and produced in GNIICTEOS under the brands of SiEl and STYK compounds is presented. The compositions feature high dielectric characteristics, water- and humidity resistance, adhesion to most constructional materials, working ability in corrosive environment, vacuum, when exposed to high shock and thermal loads at temperatures ranging from - 60 (-90) up to +200 (+350)°С. They are chemically and biologically inert. Basic areas of the compounds application are specified, the prospects of this polymeric chemistry trend in terms of development and implementation of new materials of such class are considered.

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**BASIC RESEARCH TRENDS AT GNIIChTEOS IN THE AREA OF ORGANOSILICON ADHESIVE SEALANTS**

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**Keywords:** polysiloxane rubber, sealant, adhesive, RTV, polycondensation, curing, Elasil.

The paper deals with the history of development and commercial implementation of RTV organosilicon adhesive sealants at FSUE GNIIChTEOS from the time of problem definition to the present day.

Doctor Vadim Severnyi, the laureate of state prize, headed the research concerning silicone one-part adhesive sealants commercial adoption and implementation in various sectors of national economy. The work began at GNIIChTEOS in the 60s of the last century.

In the course of the years devoted to the investigations in the area of one-part silicone composite materials based on RTV polysiloxane rubbers our researchers studied in detail chemical processes taking place at their production and curing. A variety of formulations, covering all sectors of the practical application of these unique materials were developed and commercially implemented.

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**HEATPROOF COMBINED LIGHTWEIGHT THERMAL INSULATING MATERIALS**

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**Keywords**: heat-insulation, refractory fiber, high-density coating, lightweight ceramic composite, modified silicones.

History of development and latest achievements of GNIIChTEOS in the area of multipurpose heat protection for operating temperature above 1600°С are described. Vacuum-formed material was developed based on various alumina fiber modifications including preceramic organoelement compounds (polyalumoxane elementoxanes) of 150 - 250 kg/m3 density for operating temperatures up to 1800оС (basic material). Compositions for high-density coatings forming ceramics were developed. The compositions were produced on the basis of heat resistant filled silicones modified by nanosize fragments. The coatings are formed at room temperature and adhere to various engineering materials. The coatings are applied on the basic material. Thermal treatment results in ceramic composite combining high performance heat protection of lightweight refractory with high-temperature erosion resistance of high-density working surface coating, at the same time adhesive fixing to load-bearing structures is possible.

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**NANODISPERSED POWDERS: TECHNOLOGICAL AND ECONOMIC ASPECTS**

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**Keywords:** nanodispersed powders, plasma method, plasma reactor, nanoaluminum, nanoboron, electric arc plasma, investment project, financial risks.

The most promising methods for producing nanopowders and related materials, including plasma technology, which uses an electric arc method for substances recondensation are considered. The methods for coarse silicon powder, silicon carbide, alumina recondensation in the low temperature argon plasma are described. We discuss the most rational modes of obtaining nanoproducts, difficulties and unsolved problems.Technical and economic assessment of the market potential of the results was conducted. In particular, the cost of nanoproducts was estimated. It is shown that the unit cost of nanopowders depends on the cost of raw material, the complexity of its preparation for the production, as well as the characteristics of the obtained nanoproducts. Evaluative analysis of possible risks and ways to minimize them was performed. It was found out that the main risk in the implementation of the investment project on this topic can be associated with the marketing of the nanopowders and promising compositions on their basis, and may be manifested in the reduction in sales volume of nanoproducts due to changes in the business trends, unfavorable changes in prices of raw materials and resources, increase of production costs. Moreover, the financial risks such as inflation, currency and liquidity risks are of particular importance.

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