

**Федеральное государственное бюджетное учреждение науки Институт синтетических полимерных материалов им. Н.С. Ениколопова
Российской академии наук**

Центр исследования полимеров

**Перечень публикаций, подготовленных по результатам работ, выполненных с использованием научного оборудования ЦКП
за 2023 год**

№ п/п	ID	Вид публикации	Наименование публикации	DOI публикации	Автор(ы)	Издание, номер, год	ISSN / ISBN издания	Индексация издания	Краткое описание научных результатов, полученных на оборудовании ЦКП	Наличие в публикации ссылки на ЦКП	Страница , содержащая ссылку на ЦКП
1	1A	2	3	4	5	6	7	8	9	10	11

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1	1A	2	3	4	5	6	7	8	9	10	11
1.	4071508	Статья в научном журнале	Aerogel-Like Material Based on PEGylated Hyperbranched Polymethylethoxysiloxane	10.3390/polym15194012	Kirill Borisov, Alexandra Kalinina, Aleksandra Bystrova, Aziz Muzafarov	Polymers, 19, 15, 2023	2073-4360	Scopus	Aerogels are a class of materials that have gained increasing attention over the past several decades due to their exceptional physical and chemical properties. These materials are highly porous, with a low density and high surface area, allowing for applications such as insulation, catalysis, and energy storage. However, traditional aerogels, such as pure silica aerogels, suffer from brittleness and fragility, which limit their usefulness in many applications. Herein, we have addressed this problem by using organosilicon compounds, namely polymethylsilsesquioxane derivatives, for the synthesis of aerogel-like materials. Specifically, we have developed a novel approach involving surfactant-free synthesis of microcapsules from partially PEGylated hyperbranched polymethylethoxysiloxane. Due to the highly diphilic nature of these compounds, they readily concentrate at the oil/water interface in aqueous emulsions encapsulating oil droplets. During the subsequent condensation, the organosilicon precursor is consumed for hexane encapsulation (yielding hollow microcapsules) followed by the formation of a continuous condensed phase. Concurrently, methyl groups ensure the hydrophobicity of the resulting materials, which eliminates the need of using additional reagents for their hydrophobization.	Да (если в тексте публикации указано название ЦКП или УНУ)	10

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1	1А	2	3	4	5	6	7	8	9	10	11
2.	4084393	Статья в научном журнале	Approaches to Obtaining Water-Insoluble Fibrous Matrices from Regenerated Fibroin	10.3390/technologies11050146	Nataliya Kildeeva, Nikita Sazhnev, Maria Drozdova, Vasilina Zakharova, Evgeniya Svidchenko, Nikolay Surin, Elena Markvicheva	Technologies, 5, 11, 2023	2227-7080	Scopus	Silk fibroin (SF) holds promise for the preparation of matrices for tissue engineering and regenerative medicine or for the development of drug delivery systems. Regenerated fibroin from Bombyx mori cocoons is water-soluble and can be processed into scaffolds of various forms, such as fibrous matrices, using the electrospinning method. In the current study, we studied the correlation between concentrations of fibroin aqueous solutions and their properties, in order to obtain electrospun mats for tissue engineering. Two methods were used to prevent solubility in fibroin-based matrices: The conversion of fibroin to the β -conformation via treatment with an ethanol solution and chemical cross-linking with genipin (Gp). The interaction of Gp with SF led to the appearance of a characteristic blue color but did not lead to the gelation of solutions. To speed up the cross-linking reaction with Gp, we propose using chitosan-containing systems and modifying fibrous materials via treatment with a solution of Gp in 80% ethanol. It was shown that the composition of fibroin with chitosan contributes to an improved water resistance, reduces defective material, and leads to a decrease in the diameter of the fibers. The electrospun fiber matrices based on regenerated fibroin modified by cross-linking with genipin in water-alcohol solutions were shown to promote cell adhesion, spreading, and growth and, therefore, could hold promise for tissue engineering.	Да (если в тексте публикации указано название ЦКП или УНУ)	14

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1	1А	2	3	4	5	6	7	8	9	10	11
3.	4084945	Статья в научном журнале	Approaches to the Functionalization of Organosilicon Dendrones Based on Limonene	10.3390/ap13042121	Aleksei I. Ryzhkov, Fedor V. Drozdov, Georgij V. Cherkaev, Aziz M. Muzafarov	Applied Sciences (Switzerland), 4, 13, 2023	2076-3417	Scopus	Previously, we reported the synthesis of carbosilane and carbosilane-siloxane dendrons of various generations based limonene, a natural terpene. Limonene that contains two double bonds, namely cyclohexene and isoprenyl ones, was shown to undergo regioselective hydrosilylation exclusively at its isoprenyl double bond. This finding was used to prepare carbosilane dendrons (CDs) with a limonene moiety at the focal point. In this study, we present variants for the functionalization of the cyclohexene double bond by an epoxidation reaction in order to use the resulting dendrons for the preparation of various macromolecular objects, including Janus dendrimers (JDs), dendronized polymers, and macroinitiators. Moreover, it was shown that dendrons with peripheral azide functions could be obtained. These methods offer both the possibilities of the further growth of branches and the addition of polymers with a different nature by the azide-alkyne cycloaddition reaction.	Да (если в тексте публикации указано название ЦКП или УНУ)	11

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1	1А	2	3	4	5	6	7	8	9	10	11
4.	4084387	Статья в научном журнале	Crystals of 4,7-Di-2-thienyl-2,1,3-benzothiadiazole and Its Derivative with Terminal Trimethylsilyl Substituents: Synthesis, Growth, Structure, and Optical-Fluorescent Properties	10.3390/cryst13121697	Valery A. Postnikov, Georgy A. Yurasik, Artem A. Kulishov, Timofei A. Sorokin, Maria S. Lyasnikova, Nataliya I. Sorokina, Maxim S. Skorotetsky, Vlada V. Popova, Lev L. Levkov, Oleg V. Borshchev, Evgeniya A. Svidchenko	Crystals, 12, 13, 2023	2073-4352	Web of Science; Scopus	Among short donor-acceptor molecules with a central benzothiadiazole fragment, 4,7-di-2-thienyl-2,1,3-benzothiadiazole (T-BTD) is one of the most well-known compounds, valued for its photophysical and semiconductor properties. We have synthesized a derivative of 4,7-di-2-thienyl-2,1,3-benzothiadiazole with trimethylsilyl end-substituents, 4,7-bis(5-(trimethylsilyl)thiophen-2-yl)benzothiadiazole (TMS-T-BTD). The phase transition parameters and thermal stability of T-BTD and TMS-T-BTD were investigated using DSC and TGA methods. The presence of the trimethylsilyl end-groups in TMS-T-BTD significantly enhances solubility, increases the melting temperature, and improves the resistance of TMS-T-BTD to evaporation in the liquid state. Single crystals of T-BTD and TMS-T-BTD were grown from solutions, with the largest sizes being 7 × 2 × 0.5 mm ³ and 8 × 1 × 0.45 mm ³ , respectively. Using single-crystal X-ray diffraction at 293 K, the crystal structure of T-BTD was refined in the rhombic system (sp.gr. Pcab, Z = 8), while for TMS-T-BTD, it was determined for the first time in the monoclinic system (sp.gr. P21/c, Z = 4). The relationship between observed growth anisotropy and molecular packing in the crystals was analyzed. The results of investigations into the spectral-fluorescent properties of solutions in hexane and THF are presented. The solvatochromic effect was studied in a series of solvents, including hexane, THF, dichloromethane, and acetonitrile. The photostability of the compounds in hexane solutions was examined. It was found that the quantum yield of photodestruction for T-BTD is 13 times higher than that of TMS-T-BTD. The fluorescent properties of T-BTD and TMS-T-BTD crystals were investigated.	Да (если в тексте публикации указано название ЦКП или УНУ)	18

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5.	4084409	Статья в научном журнале	Efficient method for fabrication of reusable printed organic electrochemical transistors for liquid sensors based on the complex of poly(3,4-ethylenedioxythiophene) with poly(styrenesulfonic acid)	10.1007/s11172-023-3881-3	Ya. O. Titova, E. Yu. Poimanova, A. A. Trul, E. V. Agina, S. A. Ponomarenko	Russian Chemical Bulletin, 5, 72, 2023	1066-5285	не индексируется	The optimal composition of PEDOT:PSS-based ink for inkjet printing of the semiconductor layer for liquid sensors is determined. It was proposed to modify silicon substrates with (3-aminopropyl)triethoxysilane to improve the adhesion of the printed semiconductor layer. This made it possible to fabricate organic electrochemical transistors that demonstrated stable operation under reusable conditions in physiological solutions with high ionic strength without significant loss of performance.	Да (если в тексте публикации указано название ЦКП или УНУ)	8
6.	4071511	Статья в научном журнале	Environmentally Friendly Synthesis and Self-Catalytic Hydrolysis of Triazole-Modified Organosilanes for Polysiloxane Production	10.1002/slct.202303431	Vasilissa A. Aristova, Kseniia A. Bezlepina, Kseniia S. Klokova, Sofia N. Ardabevskaia, Fedor V. Drozdov, Georgij V. Cherkaev, Sergey A. Milenin	ChemistrySelect, 42, 8, 2023	2365-6549	Web of Science; Scopus	Organotrialkoxysilanes are unique compounds that play an important role in modern science and industry. Their structure determines their varied use both in production and academic research. The development of the synthesis of organotrialkoxysilanes and polymers based on them, taking into account environmental realities, is an important task. In our work, we present an original approach for the preparation of organotriethoxysilanes, starting from azidoalkyltriethoxysilanes and various types of substrates containing a terminal triple bond, by the azide-alkyne cycloaddition (CuAAC) mechanism without the use of solvents, catalyst ligands, and amines. We also found the self-catalyzing effect of the triazole fragment resulting from the azide-alkyne cycloaddition in the reaction of hydrolysis and condensation of alkoxy groups, which made it possible to obtain a series of silsesquioxane products only by adding water, without the use of catalysts. As a result, a new, original scheme for the preparation of organosilicon organotrialkoxysilanes of a monomeric structure with their subsequent transformation into silsesquioxane polymers under "green" conditions is built.	Да (если в тексте публикации указано название ЦКП или УНУ)	7

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7.	4084860	Статья в научном журнале	Improving the Efficiency of Organic Solar Cells via the Molecular Engineering of Simple Fused Non-Fullerene Acceptors	10.3390/en16083443	Elizaveta D. Papkovskaya, Ji Wan, Dmitry O. Balakirev, Ivan V. Dyadishchev, Artem V. Bakirov, Yuriy N. Luponosov, Jie Min, Sergey A. Ponomarenko	Energies, 8, 16, 2023	1996-1073	Web of Science; Scopus	The development of novel non-fullerene small-molecule acceptors (NFAs) with a simple chemical structure for high-performance organic solar cells (OSCs) remains an urgent research challenge to enable their upscaling and commercialization. In this work, we report on the synthesis and comprehensive investigation of two new acceptor molecules (BTPT-OD and BTPT-4F-OD), which have one of the simplest fused structures among the Y series of NFAs, along with the medium energy bandgap (1.85 eV-1.94 eV) and strong absorption in the visible and near-IR spectral range (700-950 nm). The novel NFAs have high thermal stability, good solubility combined with a high degree of crystallinity, and deep-lying levels of the lowest unoccupied molecular orbital (up to -3.94 eV). The BTPT-OD with indan-1-one-3-dicyanvinyl terminal acceptor group is superior to its counterpart BTPT-4F-OD with 5,6-difluorindan-1-one-3-dicyanvinyl group both in the number of synthetic steps and in the photovoltaic performance in OSCs. PM6:BTPT-OD systems exhibit superior photovoltaic performance due to the higher charge mobility and degree of photoresponsiveness, faster carrier extraction, and longer carrier lifetime. As a result, BTPT-OD has almost two times higher photovoltaic performance with PM6 as a donor material due to the higher JSC and FF than BTPT-4F-OD systems. The results obtained indicate that further development of OSCs can be well achieved through a rational molecular design.	Да (если в тексте публикации указано название ЦКП или УНУ)	14

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8.	4084825	Статья в научном журнале	Luminescent push-pull triphenylamine-based molecules end-capped with various electron-withdrawing groups: Synthesis and properties	10.1016/j.dyepig.2022.110777	Dmitry O. Balakirev, Alexander N. Solodukhin, Svetlana M. Peregodova, Evgenia A. Svidchenko, Nikolay M. Surin, Yuriy V. Fedorov, Sergey A. Ponomarenko, Yuriy N. Luponosov	Dyes and Pigments, 208, 2023	0143-7208	не индексируется	Organic luminescent materials are widely used in various electronic and optoelectronic devices upon growing demands of science and technology. Enhancement of spectral-luminescence characteristics for such materials and in depth understanding of "structure-property" relationships remain challenging tasks. Herein, we report on synthesis and comprehensive investigation of the series of novel luminescent push-pull molecules with triphenylamine unit as an electron donor block and thiophene as a π -spacer, which end-capped with various types of electron-withdrawing groups (EWGs), which are commonly used for the molecular design of various functional materials in organic electronics. The results allowed us to evaluate the impact of EWG type used on the target materials characteristics. Phenyl-substituted EWGs were found to be more suitable for the design of highly thermally and electrochemically stable materials with relatively high melting temperatures and melting enthalpies. Depending on the EWG nature luminescence maxima of the luminophores demonstrated significant variability, e.g. from 509 nm to 750 nm, while the photoluminescence quantum yield (PLQY) values laid in the range of 1-89%. All luminophores showed good compatibility with a polystyrene (PS) matrix, in which PLQYs were generally higher (up to 25-fold enhancement) compared to the corresponding solutions or polycrystalline films. The changes of spectral characteristics observed for these luminophores were well described using basic relations of the semi-empirical theory of solvatochromism. Based on lifetime of excited states measurements, it was shown that the excited state non-radiative deactivation constants values the major contributors to PLQY values in THF solutions, while increase of the PLQY values in PS films can be associated with decrease of the probability of non-radiative deactivation of the excited states.	Да (если в тексте публикации указано название ЦКП или УНУ)	9
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9.	4084401	Статья в научном журнале	Metal-free organic catalyst for synthesis of low dispersity poly(ethylene glycol-block-poly lactide) copolymers with well-defined structure	10.1016/j.mencom.2023.04.033	Yulia A. Puchkova, Nikita G. Sedush, Antonina D. Ivanenko, Valentina G. Shuvatova, Galina A. Posypanova, Sergei N. Chvalun	Mendelev Communications, 3, 33, 2023	0959-9436	Web of Science; Scopus	Ring-opening polymerization of lactide was performed in the presence of 1,8-diazabicyclo[5.4.0]undec-5-ene as an organic catalyst and polyethylene glycol as a hydroxyl-containing macroinitiator. A series of amphiphilic poly(ethylene glycol-block-poly lactide) copolymers with a low dispersity (PDI = 1.1), different stereoregularity and length of the poly lactide block was obtained. Nanoparticles with a diameter of 20-25 nm were produced from selected polymers and were studied by in vitro cytotoxicity tests.	Да (если в тексте публикации указано название ЦКП или УНУ)	406
10.	4084870	Статья в научном журнале	NIR-absorbing donor-acceptor molecules based on fused thienopyrroloindole	10.1016/j.mencom.2023.04.030	Ivan V. Dyadishchev, Artem V. Bakirov, Svetlana M. Peregudova, Sergey A. Ponomarenko, Yuriy N. Luponosov	Mendelev Communications, 3, 33, 2023	0959-9436	Web of Science; Scopus	Two novel aromatic compounds containing thieno[2',3':4,5]thieno[3,2-b]thieno[2'',3'':4',5']thieno[2',3':4,5]pyrrolo[3,2-g]indole as the electron-donating center and terminal 3-(dicyanomethylene)indan-1-one (or 5,6-difluoro analogue) electron-accepting groups exhibit efficient light absorption in the red and near-infrared spectral regions, have low levels of the highest occupied molecular orbital (up to -5.65 eV) and lowest unoccupied molecular orbital (-3.91 eV) and a relatively low band gap value (up to 1.74 eV). The optical, thermal and structural properties are explored and compared with those of their closest and well known analogues, Y5 and Y6.	Да (если в тексте публикации указано название ЦКП или УНУ)	396

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1	1А	2	3	4	5	6	7	8	9	10	11
11.	4084890	Статья в научном журнале	Non-Isocyanate Poly(Siloxane-Urethanes) Based on Oligodimethylsiloxanes Containing Aminopropyl and Ethoxy Substituents	10.1134/S1811238223700406	E. S. Trankina, A. Yu. Kazantseva, D. A. Khanin, S. E. Lyubimov, E. G. Kononova, U. S. Andropova, A. M. Muzafarov	Polymer Science - Series C, 2, 65, 2023	1811-2382	Web of Science; Scopus	Environmentally friendly method for the synthesis of crosslinked poly(siloxane-urethanes) avoiding the use of toxic isocyanates has been presented. The synthesis has been performed in two stages: at the first stage, non-isocyanate poly(siloxane-urethanes) have been synthesized via aminolysis of cyclocarbonates (differing in the structure and functionality) with oligomer dimethylsiloxanes bearing aminopropyl and ethoxy substituents, and crosslinked non-isocyanate poly(siloxane-urethanes) have been obtained via hydrolysis of the ethoxy groups with air moisture. According to the TGA data, processes of thermooxidative decomposition of the non-isocyanate poly(siloxane-urethanes) begin at 240–260°C, depending on the structure of the organic block. Structural organization of the films has been investigated and glass transition temperature of two blocks (flexible siloxane and rigid urethane ones) has been determined by means of DSC and TMA. Surface of the film samples of non-isocyanate poly(siloxane-urethanes) has been assessed by means of scanning electron microscopy	Да (если в тексте публикации указано название ЦКП или УНУ)	9

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1	1A	2	3	4	5	6	7	8	9	10	11
12.	4084372	Статья в научном журнале	Novel Approach to the Synthesis of Bithiophenesilane Dendrimers with Efficient Intramolecular Energy Transfer	10.1134/S1811238223700261	M. S. Skorotetskii, O. V. Borshchev, E. A. Kleimyuk, E. A. Svidchenko, N. M. Surin, S. A. Ponomarenko	Polymer Science - Series C, 2, 65, 2023	1811-2382	Web of Science; Scopus	A synthetic scheme allowing the preparation of nanostructured organosilicon luminophores of branched or dendritic structure with up to 18 bithiophenesilane donor fragments and one central acceptor fragment has been elaborated. This universal scheme has been successfully upscaled to 20 g of the product, and its efficiency has been verified by the synthesis of two earlier unknown bithiophenesilane dendrimers with dense molecular shell and the central acceptor fragment, 1,4-bis(5-phenylthienyl-2-yl)benzene. The synthesis of more branched dendrimers under the Suzuki reaction conditions has led to the formation of the side products with the rupture of the Si-C(thiophene) bond, not typical of the synthesis of analogous compounds with lower branching degree under the same conditions.	Да (если в тексте публикации указано название ЦКП или УНУ)	228

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1	1A	2	3	4	5	6	7	8	9	10	11
13.	4084857	Статья в научном журнале	Novel low-bandgap donor-acceptor thiophene-phenylene co-oligomers for light-emitting semiconductor devices	10.1016/j.dyepig.2023.111256	Lucia Feriancová, Dmitry O. Balakirev, Roman S. Fedorenko, Alexey V. Kuevda, Vasilij A. Trukhanov, Eugenia A. Svidchenko, Nikolay M. Surin, Svetlana M. Peregudova, Petr V. Dmitryakov, Nikita O. Dubinets, Yuriy V. Fedorov	Dyes and Pigments, 215, 2023	0143-7208	Web of Science; Scopus	Thiophene-phenylene co-oligomers (TPCOs) have shown their high potential for organic light-emitting devices because of their high luminescence and efficient charge transport. However, unsubstituted TPCOs have relatively wide optical bandgaps and the high-lying lowest unoccupied molecular orbital (LUMO) energies so that efficient electron transport is a challenge. Electron-withdrawing groups (EWGs) and fluorinated fragments embedded into the TPCO molecule structure could result in the lower LUMO energy and narrower optical bandgap. Here, we report the synthesis of two novel TPCOs series with either phenylene or perfluorinated phenylene central core and end-capped with various EWGs (aldehyde, 2-ethylhexyl cyanoacetate, hexyl rhodanine and dicyanorhodanine) and with long alkyl terminal and side chains increasing the solubility. All the oligomers synthesized were found to be thermally stable and crystalline materials with relatively low LUMO energies (down to -3.50 eV), narrow bandgaps (down to 1.9 eV), and efficient photoluminescence in the green - deep red spectral regions both in solution and solid-state. The TPCOs with 2-ethylhexyl cyanoacetate EWG were crystallized in large-area single-crystal monolayers, which showed strongly polarized photoluminescence and demonstrated their high potential as active layers in solution-processed single-layer organic light-emitting transistors.	Да (если в тексте публикации указано название ЦКП или УНУ)	11

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1	1А	2	3	4	5	6	7	8	9	10	11
14.	4084402	Статья в научном журнале	Physicochemical Characteristics and Hydrolytic Degradation of Poly(lactic Acid) Dermal Fillers: A Comparative Study	10.3390/cosmetics10040110	Nikita G. Sedush, Kirill T. Kalinin, Pavel N. Azarkevich, Antonina A. Gorskaya	Cosmetics, 4, 10, 2023	2079-9284	Scopus	Dermal fillers have gained significant attention in the field of aesthetic medicine due to their ability to restore volume and correct facial wrinkles. Even though such formulations have similar compositions, they can have different microstructure and molecular characteristics, which in turn affect the biodegradation profile. This study presents the results of an investigation of the physicochemical characteristics of four dermal fillers from different manufacturers (Sculptra®, Gana V®, AestheFill®, and Repart PLA®). The molecular and supramolecular characteristics of poly(lactic acid) (L/D isomer ratio, molecular weight, degree of crystallinity), the morphology and size of PLA microparticles were determined. Hydrolytic degradation studies in phosphate buffer revealed differences in the rate of molecular weight reduction in the polymer. The obtained data may be important for the analysis and interpretation of the results of biological studies and clinical outcomes of the PLA dermal fillers.	Да (если в тексте публикации указано название ЦКП или УНУ)	12

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1	1А	2	3	4	5	6	7	8	9	10	11
15.	4084406	Статья в научном журнале	Quantitative Detection of the Influenza a Virus by an EGOFET-Based Portable Device	10.3390/chemosensors11080464	Elena Y. Poimanova, Elena G. Zavyalova, Elena A. Kretova, Anton A. Abramov, Askold A. Trul, Oleg V. Borshchev, Anna K. Keshek, Sergey A. Ponomarenko, Elena V. Agina	Chemosensors, 8, 11, 2023	2227-9040	Scopus	Elaboration of biosensors on the base of organic transistors with embedded biomolecules which can operate in an aqueous environment is of paramount importance. Electrolyte-gated organic field-effect transistors demonstrate high sensitivity in detection of various analytes. In this paper, we demonstrated the possibility of quantitative fast specific determination of virus particles by an aptasensor based on EGOFET. The sensitivity and selectivity of the devices were examined with the influenza A virus as well as with control bioliquids like influenza B, Newcastle disease viruses or allantoic fluid with different dilutions. The influence of the semiconducting layer thickness on EGOFETs sensory properties is discussed. The fabrication of a multi-flow cell that simultaneously registers the responses from several devices on the same substrate and the creation of a multi-sensor flow device are reported. The responses of the elaborated bioelectronic platform to the influenza A virus obtained with application of the portable multi-flow mode are well correlated with the responses obtained in the laboratory stationary mode.	Да (если в тексте публикации указано название ЦКП или УНУ)	12

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1	1A	2	3	4	5	6	7	8	9	10	11
16.	4071514	Статья в научном журнале	Quantitative Elasticity Mapping of Submicron Silica Hollow Particles by PeakForce QNM AFM Mode	10.3390/nano13131916	Dmitry R. Streltsov, Kirill M. Borisov, Aleksandra A. Kalinina, Aziz M. Muzafarov	Nanomaterials, 13, 13, 2023	2079-4991	Scopus	Silica hollow spheres with a diameter of 100–300 nm and a shell thickness of 8 ± 2 nm were synthesized using a self-templating amphiphilic polymeric precursor, i.e., poly(ethylene glycol)-substituted hyperbranched polyethoxysiloxane. Their elastic properties were addressed with a highfrequency AFM indentation method based on the PeakForce QNM (quantitative nanomechanical mapping) mode enabling simultaneous visualization of the surface morphology and high-resolution mapping of the mechanical properties. The factors affecting the accuracy of the mechanical measurements such as a local slope of the particle surface, deformation of the silica hollow particles by a solid substrate, shell thickness variation, and applied force range were analysed. The Young's modulus of the shell material was evaluated as $E = 26 \pm 7$ GPa independent of the applied force in the elastic regime of deformations. Beyond the elastic regime, the buckling instability was observed revealing a non-linear force–deformation response with a hysteresis between the loading and unloading force–distance curves and irreversible deformation of the shell at high applied forces. Thus, it was demonstrated that PeakForce QNM mode can be used for quantitative measurements of the elastic properties of submicron-sized silica hollow particles with nano-size shell thickness, as well as for estimation of the buckling behaviour beyond the elastic regime of shell deformations.	Да (если в тексте публикации указано название ЦКП или УНУ)	20

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1	1A	2	3	4	5	6	7	8	9	10	11
17.	4084403	Статья в научном журнале	Spectrally Selective Full-Color Single-Component Organic Photodetectors Based on Donor-Acceptor Conjugated Molecules	10.3390/molecules28010368	Artur L. Mannanov, Dmitry O. Balakirev, Elizaveta D. Papkovskaya, Alexander N. Solodukhin, Yuriy N. Luponosov, Dmitry Yu. Paraschuk, Sergey A. Ponomarenko	Molecules, 1, 28, 2023	1420-3049	Web of Science; Scopus	Photodetectors based on organic materials are attractive due to their tunable spectral response and biocompatibility, meaning that they are a promising platform for an artificial human eye. To mimic the photoelectric response of the human eye, narrowband spectrally-selective organic photodetectors are in great demand, and single-component organic photodetectors based on donor-acceptor conjugated molecules are a noteworthy candidate. In this work, we present singlecomponent selective full-color organic photodetectors based on donor-acceptor conjugated molecules synthesized to mimic the spectral response of the cones and rods of a human eye. The photodetectors demonstrated a high responsivity (up to 70 mA/W) with a response time of less than 1 μ s, which is three orders of magnitude faster than that of human eye photoreceptors. Our results demonstrate the possibility of the creation of an artificial eye or photoactive eye "protheses".	Да (если в тексте публикации указано название ЦКП или УНУ)	9

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1	1A	2	3	4	5	6	7	8	9	10	11
18.	4084872	Статья в научном журнале	Spectrally Selective Full-Color Single-Component Organic Photodetectors Based on Donor-Acceptor Conjugated Molecules	10.3390/molecules28010368	Artur L. Mannanov, Dmitry O. Balakirev, Elizaveta D. Papkovskaya, Alexander N. Solodukhin, Yuriy N. Luponosov, Dmitry Yu. Paraschuk, Sergey A. Ponomarenko	Molecules, 1, 28, 2023	1420-3049	Web of Science; Scopus	Photodetectors based on organic materials are attractive due to their tunable spectral response and biocompatibility, meaning that they are a promising platform for an artificial human eye. To mimic the photoelectric response of the human eye, narrowband spectrally-selective organic photodetectors are in great demand, and single-component organic photodetectors based on donor-acceptor conjugated molecules are a noteworthy candidate. In this work, we present single-component selective full-color organic photodetectors based on donor-acceptor conjugated molecules synthesized to mimic the spectral response of the cones and rods of a human eye. The photodetectors demonstrated a high responsivity (up to 70 mA/W) with a response time of less than 1 μ s, which is three orders of magnitude faster than that of human eye photoreceptors. Our results demonstrate the possibility of the creation of an artificial eye or photoactive eye "prostheses".	Да (если в тексте публикации указано название ЦКП или УНУ)	9

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1	1А	2	3	4	5	6	7	8	9	10	11
19.	4084404	Статья в научном журнале	Star-shaped benzotriindole-based donor compounds for all-small-molecule non-fullerene organic solar cells	10.1016/j.yepig.2023.111343	Dmitry O. Balakirev, Artur L. Mannanov, Nikita A. Emelianov, Polina K. Sukhorukova, Alexander K. Kalinichenko, Pavel A. Troshin, Dmitry Yu. Paraschuk, Sergey A. Ponomarenko, Yuriy N. Luponosov	Dyes and Pigments, , 216, 2023	0143-7208	Web of Science; Scopus	The recent success in the development of non-fullerene acceptors (NFAs) for organic solar cells (OSCs) encourages the search for novel efficient and complementary donor materials. Moreover, the in-depth understanding of the structure-property correlations for new generations of acceptor and donor materials is of great importance for the further progress in the field of OSCs. In this work the synthesis of a series of star-shaped small molecules based on benzotriindole (BTI) electron-donating core linked through bi- or terthiophene π -spacers to either hexyl dicyanovinyl or 2-ethylhexyl cyanoacetate electron-withdrawing terminal groups (EWGs) is reported. The thermal, optical and electrochemical properties of the molecules were carefully investigated and compared. The molecules were also explored as donor materials in non-fullerene (NF) OSCs in binary blends with well-known NFAs such as IDIC or Y6. The huge impact of the donor molecular structure on the device performance (up to 6 times difference in power conversion efficiency (PCE)) was evaluated due to significant difference in the active layer morphologies, which was successfully proved via scanning near-field infrared microscopy technique. The results obtained in this work demonstrate high potential of star-shaped BTI-based molecules to be used as donor materials with a new generation of NFAs and can be used for further molecular design of the highly efficient small molecule donors for NF OSCs.	Да (если в тексте публикации указано название ЦКП или УНУ)	7

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1	1А	2	3	4	5	6	7	8	9	10	11
20.	4084880	Статья в научном журнале	Stars are aligned: Triazatruxene hole transporting material hits the sweet spot to reach 20% efficiency of perovskite solar cell	10.1016/j.solmat.2022.112168	E.E. Agafonova, M.M. Tepliakova, D.O. Balakirev, I.V. Dyadishchev, P.K. Sukhorukova, A.N. Solodukhin, A. Elakshar, S.Y. Luchkin, A.M. Ionov, S.G. Protasova, A.V. Novikov	Solar Energy Materials and Solar Cells, 252, 2023	0927-0248	Web of Science; Scopus	The benchmarking of star-shaped organic semiconductors as HTMs for perovskite solar cells is presented. The triazatruxene-based compounds are promising hole-transporting materials to enable 20% device efficiency without doping. An optimal range of HOMO energy level of small-molecule hole transporting material for MAPbI3 is found experimentally. Photoluminescence quenching is proportionally related to device efficiency in the absence of the intrinsic photoluminescence.	Да (если в тексте публикации указано название ЦКП или УНУ)	7

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1	1А	2	3	4	5	6	7	8	9	10	11
21.	4084957	Статья в научном журнале	Synthesis of Multifunctional Oligomethylsilsequioxanes by Catalyst-Free Hydrolytic Polycondensation of Methyltrimethoxysilane under Microwave Radiation	10.3390/polym15020291	Alexandra A. Kalinina, Olga B. Gorbatshevich, Nikita G. Yakhontov, Nina V. Demchenko, Nataliya G. Vasilenko, Valentina V. Kazakova, Aziz M. Muzafarov	Polymers, 2, 15, 2023	2073-4360	Scopus	The catalyst-free hydrolytic polycondensation of methyltrimethoxysilane under microwaveradiation has been studied. The effect of molar ratios of the reagents (MTMS/H ₂ O = 1/0.5-1/9), radiation power (20-300 W), temperature (30-50 °C) and duration of exposure (2.5-90 min) on the course of the process is considered. It has been shown that the use of microwave radiation promotes the activation of the process, and almost complete conversion of the monomer can be achieved in 5 min at 30 °C, 20 W and an MTMS/H ₂ O ratio of 1/3. The optimal radiation power for the maximum conversion of the monomer and MeO-groups is in the range from 20 to 100 W. An increase in the water amount, the duration and temperature of the process contribute to an increase in the monomer conversion, a decrease in the content of residual MeO-groups and the yield of non-volatile oligomethylsilsequioxanes. The limits of this approach using to the synthesis of multifunctional branched polyorganosilsequioxanes are determined. Depending on the process conditions, homogeneous water-alcohol solutions of oligomethylsilsequioxane with a concentration of 20 to 50 wt.% can be obtained. The OH-group content and the molecular weight of the obtained oligomers vary from 10 to 30 wt.% and from 1000 to 600 Da, respectively.	Да (если в тексте публикации указано название ЦКП или УНУ)	12

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1	1А	2	3	4	5	6	7	8	9	10	11
22.	4084895	Статья в научном журнале	Synthesis of polycarbosilanes by the Grignard reaction from (chloroalkyl)trialkoxysilanes	10.1007/s11172-023-3840-4	O. B. Gorbatshevich, V. S. Papkov, A. M. Muzafarov	Russian Chemical Bulletin, 3, 72, 2023	1066-5285	Web of Science; Scopus	A number of polycarbosilanes (PCS) with various types of terminal groups were synthesized by the Grignard reaction with (chloroalkyl)alkoxysilanes. Their structure and properties were studied by NMR, IR spectroscopy, GPC, and TGA method. The dependence of the coke residue formation on the structure of the polymer and the nature of its terminal groups has been estimated. It was demonstrated that PCS based on (chloroalkyl)trialkoxysilanes with terminal ethynyl groups are perspective precursors for SiC ceramics fabrication.	Да (если в тексте публикации указано название ЦКП или УНУ)	776

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1	1A	2	3	4	5	6	7	8	9	10	11
23.	4084390	Статья в научном журнале	Tetrachromophoric Derivatives of Dibenzoylmethanatoboron Difluoride Based on Stereoregular Cyclotetrasiloxanes : Synthesis and Properties	10.1021/acs.jpcc.3c02300	Anastasia S. Belova, Yuriy N. Kononevich, Dmitriy S. Ionov, Viacheslav A. Sazhnikov, Anton A. Anisimov, Andrey A. Safonov, Nikolay M. Surin, Evgeniya A. Svidchenko, Yury V. Fedorov, Olga I. Shchegolikhina, Aziz M. Muzafarov	Journal of Physical Chemistry B, 26, 127, 2023	1520-6106	Web of Science; Scopus	A series of new tetrachromophoric systems based on stereoregular tetracyclosiloxanes and dibenzoylmethanatoboron difluoride derivatives have been synthesized and characterized by a complex of physicochemical methods. The photophysical properties of the synthesized compounds are studied by electronic absorption, steady-state, and time-resolved fluorescence spectroscopy. In the synthesized compounds, four dibenzoylmethanatoboron difluoride (DBMBF2)-based fluorophores are in an all-cis arrangement with respect to a cyclotetrasiloxane scaffold. DFT calculations predict that they can form H-type dimers, trimers, or tetramers with an antiparallel orientation of their ground-state dipole moments. Under UV excitation, solutions of these compounds in polar and nonpolar solvents exhibit complex fluorescence consisting of monomer- and excimer-like emissions with different lifetimes. Global fitting analysis reveals the presence of at least four kinetically distinguishable species in the excited state. The studied compounds in solutions have CIE chromaticity coordinates very close to the white color point and are promising objects for the development of next-generation single-emission materials for white illumination.	Да (если в тексте публикации указано название ЦКП или УНУ)	5895

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1	1A	2	3	4	5	6	7	8	9	10	11
24.	4084906	Статья в научном журнале	Tetrachromophoric Derivatives of Dibenzoylmethanatoboron Difluoride Based on Stereoregular Cyclotetrasiloxanes : Synthesis and Properties	10.1021/acs.jpcc.3c02300	Anastasia S. Belova, Yuriy N. Kononevich, Dmitriy S. Ionov, Viacheslav A. Sazhnikov, Anton A. Anisimov, Andrey A. Safonov, Nikolay M. Surin, Evgeniya A. Svidchenko, Yury V. Fedorov, Olga I. Shchegolikhina, Aziz M. Muzafarov	Journal of Physical Chemistry B, 26, 127, 2023	1520-6106	Web of Science; Scopus	A series of new tetrachromophoric systems based on stereoregular tetracyclosiloxanes and dibenzoylmethanatoboron difluoride derivatives have been synthesized and characterized by a complex of physicochemical methods. The photophysical properties of the synthesized compounds are studied by electronic absorption, steady-state, and time-resolved fluorescence spectroscopy. In the synthesized compounds, four dibenzoylmethanatoboron difluoride (DBMBF2)-based fluorophores are in an all-cis arrangement with respect to a cyclotetrasiloxane scaffold. DFT calculations predict that they can form H-type dimers, trimers, or tetramers with an antiparallel orientation of their ground-state dipole moments. Under UV excitation, solutions of these compounds in polar and nonpolar solvents exhibit complex fluorescence consisting of monomer- and excimer-like emissions with different lifetimes. Global fitting analysis reveals the presence of at least four kinetically distinguishable species in the excited state. The studied compounds in solutions have CIE chromaticity coordinates very close to the white color point and are promising objects for the development of next-generation single-emission materials for white illumination.	Да (если в тексте публикации указано название ЦКП или УНУ)	5895

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1	1A	2	3	4	5	6	7	8	9	10	11
25.	4084954	Статья в научном журнале	The effect of the polydimethylsiloxane chain length on the properties of four-arm siloxane stars	10.1016/j.jorganchem.2023.122650	Yulia S. Dyuzhikova, Anton A. Anisimov, Vadim V. Gorodov, E.A. Olenich, Mikhail I. Buzin, Galina G. Nikiforova, Sergey A. Kostrov, Olga I. Shchegolikhina, Aziz M. Muzafarov	Journal of Organometallic Chemistry, 989, 2023	0022-328X	Web of Science; Scopus	Five low-dispersity star-shaped polydimethylsiloxanes were synthesized. The macromolecules of the polymers contain the same branching-out center, a cis-tetraphenylcyclotetrasiloxane moiety, and the same number of arms, but with different lengths (n = 15, 21, 48, 75, and 123 Si(Me) ₂ O units). Their properties were studied by a set of physicochemical analytical methods. Viscometric studies showed that the macromolecules of the Ph ₄ -15, Ph ₄ -21, Ph ₄ -48, and Ph ₄ -75 polymers are small-sized dense balls both in solution and in melt. DSC studies identified an unusual effect of the cyclic core on the thermal behavior of the Ph ₄ -15, Ph ₄ -21, and Ph ₄ -48 polymers. Its incorporation suppresses the crystallization of PDMS-arms (up to n = 48 Si(Me) ₂ O units) at concentrations four times lower than those of known modifiers and does not affect the glass transition temperature (ca. -124°C).	Да (если в тексте публикации указано название ЦКП или УНУ)	7

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1	1А	2	3	4	5	6	7	8	9	10	11
26.	4084405	Статья в научном журнале	The influence of terminal alkyl groups on the structure, and electrical and sensing properties of thin films of self-assembling organosilicon derivatives of benzothieno[3,2-b][1]benzothiophene	10.1039/d2tc05083h	Marina S. Polinskaya, Askold A. Trul, Oleg V. Borshchev, Maxim S. Skorotetcky, Victoria P. Gaidarzhi, Siyovush K. Toirov, Daniil S. Anisimov, Artem V. Bakirov, Sergey N. Chvalun, Elena V. Agina, Sergey A. Ponomarenko	Journal of Materials Chemistry C, 5, 11, 2023	2050-7526	Web of Science; Scopus	The synthesis and systematic investigation of organosilicon derivatives of benzothieno[3,2-b][1]benzothiophene (BTBT) with different lengths of terminal alkyl groups (from C2 to C13), or without them, capable of self-assembly at the water-air interface are described. All novel compounds were obtained with high yields and purity, which was proved by ¹ H, ¹³ C and ²⁹ Si-NMR spectroscopy, gel permeation chromatography and elemental analysis. The study of their phase behavior by differential scanning calorimetry and polarizing optical microscopy showed that all the compounds are crystalline at room temperature. However, at elevated temperatures those with terminal alkyl substituents form enantiotropic smectic A or C mesophases, while the compound without terminal alkyl groups forms a monotropic nematic mesophase. The increase of the alkyl chain length from C2 to C8 leads to higher temperatures of both phase transitions: from the crystal to the disordered smectic mesophase and to the isotropic melt. X-ray diffraction measurements confirm the presence of disordered SmA and SmC phases and the ordered SmE or SmK phase, and suggest models of their packing depending on the terminal alkyl chain length. The investigation of the electrical properties of monolayer OFETs based on these compounds and their sensing responses to NO ₂ revealed the dependence of charge carrier mobility values and sensitivity parameters mainly on the surface morphology of organic semiconductors. A comparison of the semiconducting and sensing properties of different compounds investigated revealed a weak correlation between these parameters, while the best characteristics were observed for the OFETs based on the siloxane dimer of BTBT with C8 terminal groups.	Да (если в тексте публикации указано название ЦКП или УНУ)	1947

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1	1А	2	3	4	5	6	7	8	9	10	11
27.	4084898	Статья в научном журнале	Thioether-Containing Zirconium(Alkoxy) Siloxanes: Synthesis and Study of Dielectric and Mechanical Properties of Silica-Filled Polydimethylsiloxane Compositions Cured by Them	10.3390/polym15163361	Alexander N. Tarasenkov, Maria S. Parshina, Galina P. Goncharuk, Kirill M. Borisov, Evgeniy K. Golubev, Ivan B. Meshkov, Georgiy V. Cherkaev, Vitaliy G. Shevchenko, Sergey A. Ponomarenko, Aziz M. Muzafarov	Polymers, 16, 15, 2023	2073-4360	Scopus	A number of thioether-containing zirconium siloxanes, differing in their composition and metal atom shielding degree with a siloxy substituent, were synthesized and characterized. Synthesis of such compounds made it possible to evaluate the effect of sulfur atoms' presence in the cured compositions on their dielectric properties, as well as to evaluate their curing ability and influence on mechanical characteristics compared to the sulfur-free analogs obtained earlier. Studying a wide range of compositions differing in their content and ratio of metallosiloxane and silica components revealed that such systems are still typical dielectrics. At the same time, the introduction of thioether groups can provide increased dielectric constant and conductivity in comparison with previously obtained sulfur-free similar compositions in the <102 Hz frequency range (dielectric constant up to ~10-30 at frequency range 1-10 Hz). As before, the dielectric parameters increase is directly determined by the silica component proportion in the cured material. It is also shown that varying sulfur-containing zirconium siloxanes structure and functionality and its combination with previously obtained sulfur-free analogs, along with varying the functionality and rubber chain length, can be an effective tool for changing the dielectric and mechanical material parameters in a wide range (tensile strength 0.5-7 Mpa, elastic deformation 2-300%), which determine the prospects for the use of such cured systems as dielectric elastomers for various purposes.	Да (если в тексте публикации указано название ЦКП или УНУ)	24

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1	1A	2	3	4	5	6	7	8	9	10	11
28.	4071504	Статья в научном журнале	Модифицированные пленки поливинилтриметилсилана в плазме тлеющего разряда переменного тока	10.30791/1028-978X-2023-11-69-79	А. В. Зиновьев, М. С. Пискарев, А. Б. Гильман, и др.	Перспективные материалы, 11, 2023	1028-978X	ВАК; Ринц	Исследован процесс поверхностного модифицирования пленок поливинилтриметилсилана под воздействием низкотемпературной плазмы, генерируемой разрядом переменного тока пониженного давления частотой 40 кГц с рабочим газом фильтрованным атмосферным воздухом. Установлено, что под действием плазмы поверхность образцов приобретала устойчивое свойство гидрофильности. Химическая структура исходной и модифицированной пленок исследована методом рентгенофотоэлектронной спектроскопии (РФЭС), а морфология — методом атомно-силовой микроскопии (АСМ). Показано, что воздействие разряда приводит к увеличению шероховатости поверхности и образованию на поверхности слоя SiO _x , однако в меньшей степени, чем при обработке в разряде постоянного тока. Изучение газотранспортных свойств модифицированных образцов показало, что селективность по паре O ₂ /N ₂ оказывается несколько ниже, чем у пленок, обработанных в плазме постоянного тока, но при этом наблюдается большая стабильность параметров газоразделения во времени.	Да (если в тексте публикации указано название ЦКП или УНУ)	76

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1	1А	2	3	4	5	6	7	8	9	10	11
29.	4084996	Статья в научном журнале	РОСТ, СТРУКТУРА И ФАЗОВОЕ ПОВЕДЕНИЕ КРИСТАЛЛОВ ДИ-ТРЕТБУТИЛА-ПАРА-ТЕРФЕНИЛА	10.31857/S0023476123010228	В. А. Постников, Н. И. Сорокина, А. А. Кулишов и др.	Кристаллография, 68,1, 2023	0023-4761	Ринц	Представлены результаты исследования роста кристаллов производного паратерфенила - 4,4"-ди- трет-бутил-паратерфенила (tBu-3P-tBu). Методом спектрофотометрии установлена растворимость соединения в толуоле при 20°C. Впервые методами роста из растворов и парового физическо- го транспорта получены монокристаллы tBu-3P-tBu до 1 см в длину и с помощью монокристалльной рентгеновской дифракции расшифрована их структура при 85 К в триклинной пр. гр. P1 (Z = 8). Плоские прямоугольные кристаллы с наилучшими морфологическими характеристиками выращены из пара. На развитой грани таких кристаллов отмечается наличие элементарных ступеней роста высотой 1.4 нм, соответствующих молекулярным монослоям в ориентации плоскости (001). Установлено наличие полиморфного перехода при 229.2°C и мезоморфной жидкокристаллической фазы выше температуры плавления 255.6°C.	Да (если в тексте публикации указано название ЦКП или УНУ)	130

Руководитель ЦКП

_____ (Городов В.В.)