

2020 International Technology Trade Fair and Release on ZGC Forum
 “100 Best Industrial Innovations for International Technology Transfer”

As a project/technology, we obey the commitment and disclaimer to the Organizing Committee as follows:

1. Commitments

On behalf of the technology released by me, I voluntarily participate in the 2020 International Technology Trade Fair and Release on ZGC Forum “100 Best Industrial Innovations for International Technology Transfer”. (hereinafter referred to as the "Fair") and made the following commitments to the Organizing Committee:

1.1 All information provided by the declarant (including but not limited to information of the company/institution, team members, technology, presentation, etc.) is true, valid, accurate and complete. The written materials, copies or oral testimony submitted, and the signature or seal on the relevant materials are true. The relevant copies and scanned copies are consistent with the original materials.

1.2 No part of the information submitted by the declarant violates the intellectual property or proprietary rights of any third party, does not contain any defamatory or illegal material, and there is no dispute over any intellectual property rights.


1.3 From the date of submission of the technology materials to the Organizing Committee, the Committee is permitted to demonstrate the materials in public in different ways with non-commercial use.

2. Disclaimer

The declarant is aware that the information submitted for application should be free from any intellectual property rights disputes, and that any intellectual property rights disputes arising during or after the event will be the sole responsibility of the declarant instead of the Organizing Committee.

Technology Application Form

The contents with **red star** is mandatory fields

Basic Information	*Technology Name	Organization of production of carbon nanoporous sorbents for gas separation, air and water purification, methane storage			
	*Contact	Berveno Alexander Victorovich +792348896196 sorbkuz@mail.ru	*Position	CEO and Founder	
	*Graduate Institution & Major	Kemerovo state university	*Highest Degree	Post-Graduate – chemist, specialty "Physical Chemistry"	

	Email	sorbkuz@mail.ru	Tel	+79234889619
	*Company/Organisation Introduction	<p>Sorbents of Kuzbass, LLC Our company has been successfully developing activated carbon and coal chemistry materials in the market for 10 years, company has 4 patents. The company is a resident of the Skolkovo Innovation Center, a member of the Technological platforms "Technologies for the production and processing of hydrocarbons" and "Materials and technologies of metallurgy" is included in the innovative cluster "Integrated processing of coal and industrial waste" of the Kemerovo region. The company's project is included in the coal industry development program of the RF Ministry of Energy.</p>		
	*Number of team members	8 members		
	*Type of Company	<p>Please edit the font of selected project into red for electronic Ver. Industry: Domestic: <ul style="list-style-type: none"> • Public Company • Corporate Enterprise/Group • Limited Liability Company/Partnership Overseas: <ul style="list-style-type: none"> • Public Company • Corporate Enterprise/Group • Limited Liability Company/Partnership Academic: <ul style="list-style-type: none"> • University/College • Academic Society • Independent Research Organization • Others Government: <ul style="list-style-type: none"> • Official Department • Public Institution • Organisation or Associations • Others </p>		
	Website	http://sorbent.tilda.ws/activatedcarbon http://sorbkuz.com http://carboncenter.ru/		
Project Technology Information	<p>1.* Technology Field (Multiple choice, Please edit the font of selected project into red for electronic Ver.)</p> <ul style="list-style-type: none"> • AI & Advanced/high-tech Manufacturing • Health Biotechnology & Health-related Innovations • New Energy, Sustainable Development and Green Innovation • Smart Transportation & ICT 			
	<p>2.* Description Of Technology (Including but not limited to publicly disclosed technical specifications, etc.) <i>It will be better to add product pictures.</i> The technology for producing nanoporous carbon adsorbents includes: - its vibration grinding on crushing equipment to coal dust, fraction 1-40 microns; - mixing with binders - lignosulfonate and coal tar pitch;</p>			

- granulation and thermo-oxidative treatment of granules in a low-temperature activation furnace;
 - high-temperature activation - thermo-oxidative treatment of the material with air blowing and activation of the resulting material in water vapor, nitrogen, volatile gases at a temperature of 500-900°C.

When activated in water vapor, volatile gases, nitrogen or in carbon dioxide, coal loses 6-20% of the mass. At the same time, micropores of a slightly smaller size are formed in it than the thickness of burnt aromatic molecules - 0.3-0.9 nm, sorption capacity - 0.15-0.9 cm³/g, surface area - 300-1400 m² / g (according to the BET method), the coefficient of efficiency of separation of hydrogen and carbon monoxide from 15 to 70. With further activation, mesopores develop due to further burning of aromatic molecules.

Employees of the company carried out a number of works on grants from the Russian Federal Property Fund, the Skolkovo Foundation, Rusnano and the FSD MP NTS, which studied the elemental composition, surface area, total pore volume, size distribution of micro- and mesopores, and modeling the nanostructure of the starting and obtained carbon materials. As a result, a change in the structure and the formation of micro- and mesopores upon activation of the initial coal were established.

The activation technology is based on the thermal oxidation of the initial granules in water vapor and inert gases for several hours at a temperature of about 400 degrees Celsius and short-term heating at 700-800 degrees Celsius (competitors use processing temperatures of 900-1000 degrees Celsius for 4-12 hours)

The obtained samples of activated carbon and adsorbents have competitive characteristics: high strength, sorption capacity, developed surface area, pore volume, high activity in methylene blue, iodine, benzene, toluene, CCl₄, selectivity of gas separation.

Pilot batches of sorbents were made, their research was conducted in accredited laboratories and at potential consumers - JSC NIFHI name L.Ya. Karpov”(State Corporation Rosatom), ZEM RKK Energia, NPF Cyclogas LLC, NPF BAKS, HC SIBUR, GK Roskhimzashita, JSC UGMK, JSC Irgiredmet, LLC Elitech, etc.

Company presentation - <https://yadi.sk/i/XgGADiXmCygByw>

3.* Description Of The Technical Advantages (Including Equivalent/Similar Product/Technology in Market)

Activated carbons of Sorbents of Kuzbass LLC correspond to brands of leading foreign manufacturers to a greater extent: Centaur and SGL (Chemviron Carbon, Belgium), Filtrasorb 100, 200, 300, 400 (Calgon Carbon Corp.), NWM and NWC (NWC Carbon, Known -CN High-Tech Industrial Co. Ltd ”(China), JX-102 and JX-124 (China), Cecarbon GAC 1240L (Arkema, Ceca), Carbotech GmbH (Germany).

The innovation of the proposed solution:

- 1) The innovativeness of the process lies in the developed and patented environmentally friendly technology for the activation of coal to produce cheap powder and granular activated carbons and sorbents effective in gas separation and water treatment, characterized by controlled extraction of the required number of individual carbon molecules from coal raw materials with the formation of pores of the required size and the formation of the necessary properties.
- 2) The project team also developed non-standard designs and produced unique installations for producing nanoporous sorbents, patent studies confirm their novelty in the world market.

The novelty lies in the developed processes for the activation of coal raw materials with the production of molecular sieve sorbents with desired sorption-kinetic properties, which differ:

- the absence of the stage of washing from ash;
- the absence of a carbonization stage (an optimal structure has already been formed in anthracites);
- the absence of catalysts and acids in the activation processes;
- application of the developed unique equipment - installations with a vibro-fluidized bed (low-temperature and high-temperature coal activation plants).

As a result of the research carried out by the project team, a pilot coal activation line was created with a

capacity of 50 tons per year, an energy-efficient and environmentally friendly technology for the activation of coal raw materials was developed to produce nanostructured sorbents with pore sizes that allowed them to concentrate methane and carbon dioxide, separate hydrogen and carbon monoxide, helium and methane, water treatment.

4. Sustainability Of The Technical Advantages

Activated carbon and sorbents are used:

- in water treatment and wastewater treatment;
- in sorption plants for the purification of natural gas from carbon and sulfur oxides, hydrogen sulfide, mercury, processing of flue, coke and landfill gas, biogas, associated petroleum gas (APG);
- gas separation and air purification of industrial premises;
- for the recovery of hydrocarbons and the concentration of methane from mine gas;
- in the purification of amine solutions, alcohols, hydrometallurgy (extraction of gold and precious metals);
- in the RPD and as electrode material for supercapacitors and lithium-ion batteries, methane batteries.

In 2019, technical conditions were registered in the state register and certified in the voluntary certification system GOST R of four grades of carbon sorbents:

- for gas separation and purification, hydrogen evolution and purification (CMS KS-H), nitrogen purification (CMS KS-N);
- for air purification, ventilation emissions, flue gases and coke oven gas (CMS KS-O);
- for use as electrode material in supercapacitors (CMS KS-K);
- granular activated carbons for water purification ("SK AG-3"), which is an analogue of the most famous and widely used brands of activated carbons "AG-3" / "AG-5" / "Sorber" / "AR-V" / "Norit" / "SGL" / "Filtrisorb" / "NWM" / "Centaur" and several others.

5. Risk Of The Technology

- risks of non-compliance with the schedule and exceeding the project budget due to a delay in the delivery of the necessary equipment, its adjustment or breakdown (removed during the design process and due to the presence of established contacts with manufacturers and suppliers);
- the risk of scaling the technology (removed by 90% due to the design and manufacture of a pilot industrial line for the activation of coal raw materials);
- the appearance on the world market of an analogue, superior in characteristics and cheaper (reduced due to the proximity of raw materials, efficiency and originality of the know-how of equipment and technology), low labor costs and high cost of foreign currency.

6.* The Current Development Situation And Progress Of The Project

- In 2019, technical conditions were registered in the state register and certified in the voluntary certification system GOST R of four grades of carbon sorbents:
- - for gas separation and purification, hydrogen evolution and purification (CMS KS-H), nitrogen purification (CMS KS-N);
- - for air purification, ventilation emissions, flue gases and coke oven gas (CMS KS-O);
- - for use as electrode material in supercapacitors (CMS KS-K);
- - granular activated carbons for water purification ("SK AG-3"), which is an analog of the most famous and widely used brands of activated carbons "AG-3" / "AG-5" / "Sorber" / "AR-V" / "Norit" / "SGL" / "Filtrisorb" / "NWM" / "Centaur" and several others.

An expert opinion of the Federal Medical and Biological Agency of Russia on the compliance of sorbents with the Unified Sanitary and Epidemiological and Hygienic Requirements for Products

Subject to Sanitary and Epidemiological Supervision was received, a safety data sheet for products was developed, and a letter of rejection was received for the possibility of deliveries through the territory of the Customs Union.

In December 2016, two grades of powdered activated carbons were certified (SK OU-A and SK OU-B), which are analogs NWC and Chinese powdered activated carbons.

In 2017-2020, sorbents were manufactured and handed over to potential consumers for industrial testing, comparative tests were successfully passed in accredited laboratories with analogues from China, Germany, the USA, Israel, Japan, Belgium and Russia. In 2019, 20 tons of adsorbent were sold, the plan for 2020 is the sale of more than 50 tons.

7.* Project Stage

- Demonstration
- R&D
- Pilot plant test**/Pre-clinical
- Mass production/Industrialization

8.* Intellectual Property

- Patent**

Patent No.:

- 1) Method of obtaining carbon molecular sieves No. 2536972, Priority date: February 20, 2013, Assignee: «OOO «Sorbents of Kuzbass» LLC, Inventors Berveno A.V., Berveno V.P.
 - 2) Method for synthesis of composite carbon material with metal nanoparticles with transfer of part of their electronic density into carbon matrix, No. 2689738, Priority date: September 12, 2016, Assignee: «OOO «Sorbents of Kuzbass» LLC A. Berveno, V. P. Berveno
 - 3) Device for thermochemical hetero-phase processing of disperse materials with vibration liquefaction No. 2636647 Priority date: September 30, 2016, Assignee: «OOO «Sorbents of Kuzbass» LLC, Berveno A.V., Berveno V.P.
 - 4) Cap unit for high-temperature thermochemical activation of coals No. 2638390, Priority date: September 30, 2016, Assignee: «OOO «Sorbents of Kuzbass» LLC, Berveno A.V., Berveno V.P.
- In 2021, it is planned to patent technology in Europe, Asia (China) and America for the synthesis of new activated carbons for the accumulation of methane and gas purification

Patent CTO Berveno V.P.:

1. Patent No. 1838376 for the invention: "A method of obtaining a fiber-forming mesophase pitch."
Authors: Berveno V.P. and Babenko V.S.
2. Patent No. 2040789 for the invention: "A method for measuring the physical parameters of substances".
Authors: Zaitsev G.I., Shadrin A.V. and Berveno V.P.
3. Patent No. 2069036 for the invention of "Device for microwave heating." Authors: Berveno V.P., Kroman G.P.
4. Patent No. 2020476 for the invention: "A method for determining the durability of samples from composite materials." Authors: Egorov P.V., Ivanov V.V., Kolpakova L.A., Malshin A.A., Berveno V.P., Pimonov A.G.

- Trademark
- Technology Know-How**
- Computer Software

- () Industrial Design
- () IC Design
- () Copyright
- () Manufacturing Process Technology

Others _____

* **Number of Property** _____

* **Description of patents**

1 Patent:

The invention relates to the synthesis of carbon materials used for hydrogen evolution. Carbon molecular sieve is made from anthracite or coal. The raw material is oxidized with atmospheric oxygen. Oxidation is carried out by heating the raw material from 100 to 450 ° C in a downward flow of air, which is supplied at a speed of 0.5-15 m / sec. The invention provides for the production of a selective adsorbent for the evolution of hydrogen while reducing energy consumption

2 Patent:

The invention relates to reactors for thermochemical treatment of coals and the production of carbon sorbents and can be used in the field of mechanical engineering, oil, gas, coal chemistry, metallurgy. The bell-type installation with a vibration modulator of the gas flow contains a sealed housing, a cylindrical container for placing the activated material, heaters, a circulation fan located under the container with the material, two coaxial perforated cylindrical inserts for loading the activated material. material between them, located inside the material container. The body is formed by external heat-insulating and internal protective caps. The lower edge of the shell of the protective cap is immersed in the sand gate. The cylindrical container is installed inside the protective cap with a gap from the housing wall. Heaters are located in the gap. EFFECT: increased homogeneity of activation along the height and thickness of the layer of the activated material due to intensification of chemical heterophase processes, diffusion transfer, heat and mass transfer in particles during material transformation.

3 Patent:

The present invention relates to the field of mechanical engineering, oil, gas, coal chemistry, metallurgy and a number of other industries, since vibration liquefaction makes it possible to intensify chemical heterophase processes, diffusion transfer, heat and mass transfer, mechanical mixing processes, effectively reduce energy consumption for the implementation of a number of thermochemical processes in industry , including processes of activation of carbon materials, including for the production of carbon sorbents, and other dispersed materials. A device for thermochemical heterophase processing of dispersed materials with vibration fluidization, containing a heat-insulating housing and a vibration drive, material loading and unloading units, heaters evenly located at the side walls of the housing, circulating fans fixed on the lower wall of the housing, inside the housing there is a stack with a number of mesh shelves containing overflow thresholds, while the stack is installed on the stands of the vibration drive with a gap from the side walls of the body. The technical result of the invention is to increase the homogeneity of thermochemical transformations of carbon materials upon activation, reproducibility of product properties, isokineticity of material transformations during processing.

4 Patent:

invention can be used in chemical and metallurgical industry, as well as in power engineering. First, a metal salt from the solution is applied on the surface and volume of pores of the carbon material used as a matrix. Metal ions are then reduced while continuously monitoring the state of metal ions and the

	<p>carbon matrix from in-situ spectroscopy of electronic paramagnetic resonance, or dielectric spectroscopy, or matrix conductivity. Reduction is completed at a sudden change in the conductivity of the carbon matrix, sorption energy, rate of diffusion of gas molecules in the pores of the material, factor of spectroscopic splitting (g-factor) of the EPR spectrum, relaxation time of resonance transitions of unpaired electrons. Composite carbon material with metal nanoparticles is obtained.</p> <p>The project consultants have international patents, patenting experience in the Russian Federation, Europe and the USA, as well as more than 100 publications on the subject of the project in leading scientific journals, conference abstracts, and proceedings of symposia.</p> <p>9. Description Of The Technical Requirements</p> <p>Low ash carbon feedstock.</p> <p>Environmental safety - low amount of gas emissions.</p> <p>Sanitary area at least 500 meters.</p>
Information of Product and Marketing	<p>10. *Final Product And Brief Introduction</p> <p>Product form:</p> <p>() Final consumer product</p> <p>(V) Industrial Products</p> <p>() Industrial intermediate products</p> <p>() Technical Services</p> <p>others _____</p> <p>product brief introduction</p> <hr/> <p>11. * Application Scenarios</p> <p>Activated carbon and sorbents are used:</p> <ul style="list-style-type: none"> - in water treatment and wastewater treatment; - in sorption plants for the purification of natural gas from carbon and sulfur oxides, hydrogen sulfide, mercury, processing of flue, coke and landfill gas, biogas, associated petroleum gas (APG); - gas separation and air purification of industrial premises; - for the recovery of hydrocarbons and the concentration of methane from mine gas; - in the purification of amine solutions, alcohols, hydrometallurgy (extraction of gold and precious metals); - in the RPD and as electrode material for supercapacitors and lithium-ion batteries, methane batteries. <hr/> <p>12. * Prospective Market Value/Business Value</p> <p>The cost of the company "Sorbents of Kuzbass" and patents - \$ 2 million (official financial cost).</p> <p>The sale price of activated carbon for water, air, and methane storage is \$1800-2200/ton (prime cost \$ 500/ton), the price of carbon sorbents for hydrogen and nitrogen is \$5000-7000/ton (prime cost \$650/ton).</p> <hr/> <p>13. * Potential Clients</p> <p>Sorbents of Kuzbass has agreements with potential customers for product introduction: Chinook Science Ltd., Shanghai Hengye Molecular Sieve Co. Ltd., Gazprom, Rosneft, Lukoil, SIBUR, Antipinsky Oil Refinery, Roskhimzashita Corporation (ROSTECH Tech Group), Taneko, TAIF-NK, Geliymash, SDS-Nitrogen, UMMC, Cyclogas, New Technologies, Krasnodar Compressor Plant, Chelyabinsk Compressor Plant, VNIUS, Khromatek, Reotek, Ecoline, OEK Holding, Research Institute of Associated Petroleum Gas, Inbio, Elitech, which are ready to test activated carbon and sorbents and have a great</p>

need for products (consumption of more than 5000 tons per year).

14. Marketing Strategy

The international team is ready to help the project in promoting products to the world market. To enter foreign markets, it is planned to interact:

- with the Russian export center;
- technology transfer centers, foreign scientists, experts, accelerators, technology parks, industrial zones, consulting companies;
- with the hydrogen center of Spain;
- With the Sino-Russian Center for Technology Transfer of the Rubber Valley of China: in 2019, a cooperation agreement was signed.

To enter the North American market, there are cooperation with Select Trading Solutions Inc. (Canada) and USBC and Investments, in Italy with Estes Trade and Patrol International.

In Japan, products are being tested at Tomoe Engineering and interacting with Sogis Corporation, and in India with SRB International.

15. Business Plan In The Coming 3 Years

The commercialization scheme is based on the production and delivery of carbon adsorbents to the Russian and foreign markets to direct consumers of carbon adsorbents for air purification (concentration of methane, carbon dioxide), purification of natural gas, flue gases and APG, as well as for the separation of nitrogen from the air, extraction and purification of hydrogen from synthesis. -gas, helium from natural gas.

The company has developed a strategy for promoting products to the market.

It is supposed to bring the product to the market in two stages:

- Stage 1 (2017-2021) - Market of the Russian Federation and CIS countries (Mongolia, Kazakhstan, Belarus, etc.);
- Stage 2 (2020-2025) - Markets in Asia and Europe.

Sequence of actions for entering the market:

1) In 2016-2019, in order to attract orders from the company and from partners, comparative tests of pilot batches of our carbon sorbents and foreign analogues were carried out, including in specialized research institutes and from potential customers.

2) In 2020-2021, it is planned to refine the coal activation technology and conduct tests of carbon molecular sieve sorbents for nitrogen release at NPK Provita, OJSC Geliimash, PJSC Cryogenmash (OJSC OMZ), LLC Khimmash- Apparatus "for studying the effectiveness of pilot batches of UMS in industrial processes of gas separation. In addition, it is planned to supply UMS for the extraction and purification of hydrogen at OJSC Angarsk Polymer Plant (NK Rosneft). It is also planned to refine the technology for producing import-substituting carbon sorbents for water treatment based on anthracites and coal from the Kuznetsk Basin to bring two products to the domestic market (a sorbent for purifying industrial water, and a sorbent for treating oil effluents).

In 2020, it is planned to develop the Russian market for carbon molecular sieves and activated carbons and sell about 5 tons by the end of the year, as well as receive preliminary orders for 2021 in the amount of 100

	<p>tons or more. To do this, it is planned to transfer sorbents for testing to CJSC Grasy, OJSC VNIIMT, AO Krastsvetmet, AO SDS-Azot, AO Taneco, AO Transneft and other companies with which there are preliminary agreements. The option of transferring samples for paid tests to OOO GAZPROM VNIIGAZ, OAO VNIIMT and AO VNIUS is being considered.</p> <p>3) In 2021-2022, it is planned to manufacture production equipment and increase productivity to 3-4 thousand tons of carbon sorbent per year, further expand the product line in accordance with market demands (for example, a mesoporous sorbent for use as a catalyst carrier) and withdrawal products to the American and Asian markets.</p> <p>4) In 2021-2023, it is planned to refine the technology for the production of nanoporous sorbents for use in the manufacture of supercapacitors - a new generation of highly efficient mobile power sources. In 2022, it is planned to supply for testing and bring to the market batches of sorbents for use as electrode material. Potential customers with whom negotiations were held are RSC Energia named after Korolev, PJSC Novosibirsk Chemical Concentrates Plant (TVEL JSC, Rosatom State Corporation), Elitech LLC, Energia OJSC, Nesscap Russia ("Rusnano") and others.</p> <p>In 2021, it is planned to patent technology in Europe, Asia (China) and America for the synthesis of new activated carbons for the accumulation of methane and gas purification</p> <p>16. Briefly Describe The Development Of The Project's Industry In China</p> <p>The market for carbon sorbents in China is more than 500 thousand tons, exports - more than 100 thousand tons. The Chinese market is over \$ 600 million.</p> <p>The main consumers in the Chinese market are oil and gas, chemical, energy, engineering, food, transport companies, and the housing and utilities sector.</p>
<p>Information of Intent Cooperation</p>	<p>17. *Ideal Way of Cooperation (Multi-Select, please edit the font of selected project into red for electronic Ver.)</p> <ul style="list-style-type: none"> • Providing technical services • Providing technical consulting • Technology development (cooperation & delegation) • Transfer of technical secrets • Transfer of patent right • Transfer of patent application right • Patent (patent pending technology) exploitation license • Cooperative production • Project contracting • Equipment importation • Built-operate transfer franchise • Franchising • Compensation trade • Expert service • Equity investment & cooperation • Sole proprietorship (landing or settlement of joint ventures) • Market development of innovative technology products • Contract research & outsourcing • Supply chain cooperation of innovative technology

18. Ideal Partners (Please edit the font of selected project into red for electronic Ver.)

Industry:

Domestic:

- **Public Company**
- **Corporate Enterprise/Group**
- Limited Liability Company/Partnership

Overseas:

- **Public Company**
- **Corporate Enterprise/Group**
- Limited Liability Company/Partnership

Academic:

- University/College
- Academic Society
- Independent Research Organisation
- Others

Government:

- Official Department
- **Public Institution**
- Organisation or Associations
- Others

19. * Current Financing Situation (if any, please indicate the time, amount and investment subject)

There is experience in R&D management:

1. "Creation of carbon molecular sieves", agreement with GC Rusnano No. 1404/1, 2010, \$150 thousand.
2. "Development of a technology for the production of sorbents from Kuzbass coals", agreement with the Fund for the Promotion of Innovations No. 9130r / 14904, winner of the grant program "START" competition in 2011, \$20 thousand.
3. "Carbon sorbents for gas separation", grant from the Governor of the Kemerovo Region, \$250 thousand.
4. Skolkovo Foundation grant for the project "Carbon nanoporous sorbents", 2012, \$40 thousand.
5. Grant of the administration of Kemerovo for the development of the project, 2012, \$8 thousand.
6. "Development of a technology for producing carbon molecular sieves for gas separation and the creation of their production", grant program "START2" program by the Innovation Support Fund (project No. 14904), 2013-2014, 2 million rubles.
7. "Development, manufacture and commissioning of a pilot line for the activation of coal for sorbents and the development of technology for their granulation", agreement with the Skolkovo Foundation, 2015-2016, \$0,5 million.
8. "Determination of the possibility of obtaining highly effective nanoporous adsorbents from anthracite for the separation of hydrogen and carbon monoxide, the concentration of methane and carbon dioxide", an agreement on research with JSC Siberian Anthracite, 2016, \$5 thousand.
9. "Expansion of the pilot production of powder and granular carbon sorbents for gas and water purification", "Business-Start" program of the Innovation Promotion Fund, 2017-2018, \$35 thousand.
10. "Development of recommendations for the design of the production of semi-coke from long-flame coals of the Kuznetsk basin", a research and development agreement with LLC "Kuzbassugolkhim", 2019-2020, \$15 thousand.

	<p>20. * Planned Investment 5 million dollars (Investment from fund, industrial groups, government companies)</p> <p>21. Other Cooperation Requirements (Including the ideal partners, financial and working space support needed to start your business in China)</p> <p>Coal chemistry company, oil or gas group: Shenhua Group, Sinoma Group, China venture group Co, etc.</p>
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<p>*Brief introduction of team members</p>	<p>It must include the member's name, job title, degree, graduate school, photo and personal profile.</p> <p>The project team has 8 employees:</p> <ul style="list-style-type: none"> - A.V. Berveno, CEO and Founder, work experience 12 years, chemist – KemSU, 101 publications, 4 Russian patents, work experience in SIBUR, Siberian Branch RAS, Center of Coal Technologies and New Carbon Materials, with Rusnano, Skolkovo. - V. P. Berveno, Director of Science, work experience 45 years, chemist-engineer - KuzSTU, more than 150 publications, 8 patents, Ph. D. in Chemistry, senior research scientist, work experience in Koks, VostNII, Institute of Solid State Chemistry and Mechanochemistry of SB RAS, project management with the Ministry of industry and Trade of the Russian Federation - A.G. Tkachev, work experience 40 years, Scientific consultant, Ph.D. of Technical Sciences, Professor, Academician of the Russian Academy of Natural Sciences. Head of the Department "Engineering and Technology of Engineering", Director of the Tambov Innovation and Technology Center for Engineering and LLC "Nanotechcentre". The number of printed works, monographs and study guides is 130. The owner of 50 copyright certificates. The author of the patent for the invention of the Russian Federation "Method for producing carbon nanomaterials", 2012. - T.V. Sunyaeva, Head of Laboratory, in charge of the factory laboratory for 25 years - A. Y. Bessogonov, , Chief Technologist, work experience in designing 48 years: PAO "Koks" - V.A. Poluboyarov, Professor of NSTU, Doctor of Chemistry, senior research scientist of Institute of Solid State Chemistry and Mechanochemistry of SB RAS, head of the group of methods of dispersion-composite hardening of metals <p>The project is being implemented by an international team of specialists on the territory of the Kuzbass Technopark and Vtorpolymer LLC, with an area of 1000 sq.m., analytical and production equipment was purchased. The project team has experience in conducting custom research work for the Ministry of Industry and Trade of the Russian Federation and state funds - Rusnano, Skolkovo Foundation, Innovation Support Fund, Russian Foundation for Basic Research, Siberian Anthracite, SUEK and Kuzbassugolkhim coal holdings, oil and gas corporations GAZPROM, Ryazan Oil Refining Company (Rosneft Oil Company), Yaya Oil Refinery (Neftekhimservis), TION and Promintech companies, the Institute of Coal and Technology of Kazakhstan, and the Russian Academy of Sciences. The company's developments were included by the Ministry of Energy in the program for the development of the coal industry of the Russian Federation until 2035.</p> <p>In 2012, the project of the Sorbents of Kuzbass company passed an examination and received a certificate of a resident of the Skolkovo Innograd and the Coal Chemical Cluster of the Kemerovo Region, and at the end of 2015 the company was certified in the integrated quality management system "New Quality Technologies", which includes certification for international standards ISO 9001, 14001 and OHSAS 18001. In 2016, certification of a testing laboratory for the analysis of activated carbon and sorbents was carried</p>
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out.

Key experience in the management of research and development:

- "Development of methods for producing carbon fiber from coal tar pitch" under an agreement with the Ministry of Industry and Trade of the Russian Federation and Atlantic Research Corporation (USA).
- "Synthesis and study of sorption, concentration of hydrogen by carbon-fiber nanostructured molecular sieves doped with palladium and potassium" under an agreement with St. Petersburg Scientific Center, 2004;
- "Technical conditions for carbon monofilament from isotropic coal tar pitch", agreement with FSUE GNIHTEOS, Rosprom, 2005;
- according to the plan of fundamental research of the Russian Academy of Sciences, at the Institute of Chemical and Technical Physics of the SB RAS, in the performance of work in 2006-2009, topic: "19.1. Creation of a new generation of materials for various functional purposes for use in engineering, medicine, and chemical technology. Chemistry of nanoparticles and nano-objects. Nanodispersed systems and nanocomposites based on them";
- within the framework of the plans of the RAS Scientific Council for adsorption and chromatography on the topic "Synthesis and study of the properties of carbon molecular sieves with elementary nanofragments", 2007-2009;
- R&D work with the Ministry of Industry and Trade of the Russian Federation within the framework of the Federal Target Program "Development, restoration and organization of production of strategic, scarce and import-substituting materials and small-tonnage chemistry for weapons, military and special equipment for 2009-2011 and for the period until 2015":
- "Development of manufacturing technology for carbon monofilament (core for silicon carbide fibers)";
- "Development of a technology for modifying thermoplastic binders with carbon particles to form elementary fragments of carbon matrices".

On the subject of scientific work published more than 100 papers and abstracts of conferences. Main articles:

1. Berveno A.V., Bryukhovetskaya L.V., Naimushina T.M., Sozinov S.A., Trushkin N.Y., Sharpenkova T.G., Berveno V.P., Petrov I.Y. Molecular Pore Formation Mechanism in Nanostructured Carbon Fibers, CARBON 2005: Int. Conf. on Carbon, Gyeongju, Korea: Book Abstr. Gyeongju: Korea Carbon Society, 2005. P. 36., fail P01-08.
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