



ULNANOTECH®
Ulyanovsk Technology Transfer Center

PROJECT
PORTFOLIO | **2022**



NANOTECHNOLOGY CENTER

SERIAL BUILDING OF
TECH STARTUPS

13-14 / STROYLAB

R&D company focusing on the development of state-of-the-art construction materials

15-16 / MONOSTONE

street furniture – products for various functions to be used in public spaces

17-18 / DREAMWOOD

production of modified wood

19-20 / ECODSP

technology for production of environmentally sound phenol-formaldehyde-free particle board

21-22 / RUGADGET

contract development of microelectronics

23-24 / THERMOMETER LEKKO

portable wearable device designed for body temperature measurement

25-26 / SMART HOME

integrated service control system for real estate developers and utility providers

27-28 / RVR

project team focusing on the development of virtual/augmented reality (VR/AR)-based apps

29-30 / SAFE

safe designed and manufactured from aluminum matrix composites with enhanced level of protection

31-32 / METAL COMPOSITE

development and production of goods made from metal matrix composites

33-34 / HEATLAB

development of composite materials with targeted properties based on heat flow management (thermal management)

35-36 / HYDROGEN

portable fuel cell power system with hydrogen storage based on magnesium hydride

37-38 / HEATLAB

production of magnesium hydride

39-40 / ALTREN

RES-based autonomous hybrid power generating systems

41-42 / ALTREN

manufacturing of 100kW and 300kW wind turbines

43-44 / COMBERRY

accelerated development of multi-functional thin-film coatings via PVD

45-46 / TUNOX

smart electrochromic glass

47-48 / THINIKA

thin-film pseudocapacitors for IoT devices

WHO WE ARE ULNANOTECH

ULNANOTECH was founded in 2011 by the RUSNANO Fund for Infrastructure and Educational Programs, governmental and private investors of Ulyanovsk in order to enhance the innovative resources of the region. It is an infrastructure for launch and development of new tech startups.

SERIAL ENTREPRENEUR

We launch innovative tech companies (startups), select technologies and research markets to build successful businesses for future sale.

We set up tech companies with a view to create centers of excellence across various sectors of industry while developing new technologies.

OUR PRODUCT IS HIGH-TECH COMPANIES



OUR GOAL

Jointly with other nano industry companies transform Russia into one of global technology leaders

KEY OBJECTIVES

- Serial launch of startups
- Searching for professionals and building breakthrough teams
- Development of tech entrepreneurship competencies

OPPORTUNITIES

- "Turnkey" projects, business deal structuring
- Attracting partners and co-investors from Russia and abroad
- Startup marketing
- Legal and accounting support services for project companies
- Patent search and IP protection services
- Engagement and collaboration with all Russian development institutions and funds

RESOURCES

- Our own infrastructure available for startups
- Ecosystem composed of tech entrepreneurs, scientists and engineering companies
- Investment projects
- Team of professionals

TECH STARTUP FACTORY



FUND FOR INFRASTRUCTURE AND EDUCATIONAL PROGRAMS

ULNANOTECH is part of a network of 15 nanocentres.

Being the first venture-building network in Russia, it serves as a platform for mass building and sale of tech businesses operating in material-based industries.

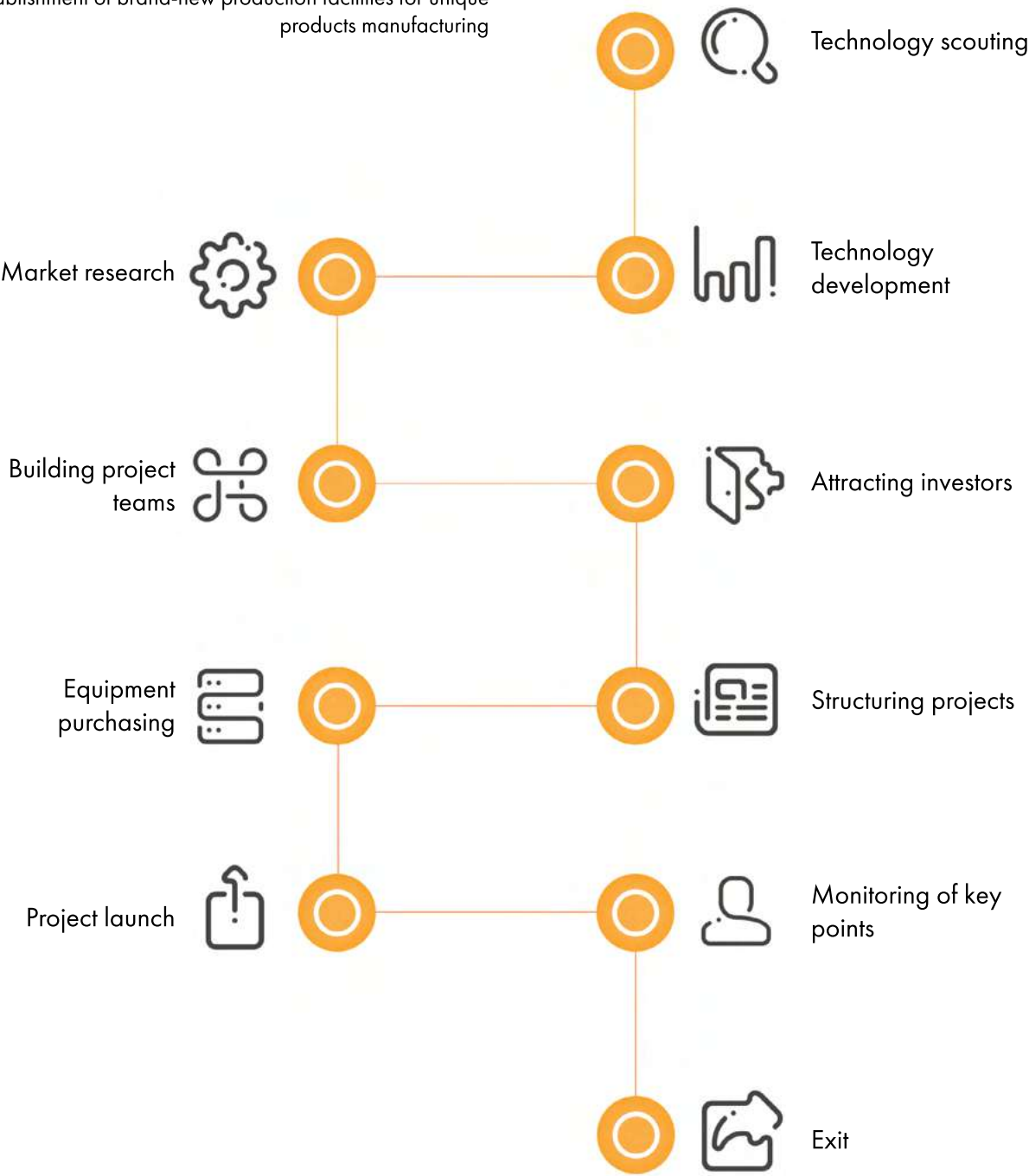
The network nature of the nanocenters enables the concentration of all developments and infrastructure in one most favorable location available to several regional ecosystems.

The nanocenters within the network directly participate in the management of created companies and attract private investments when building and developing businesses.

The nanocenters invest in those startups, which are in demand in the global technology market. Now over 700 startups are being built within the network of nanocenters.

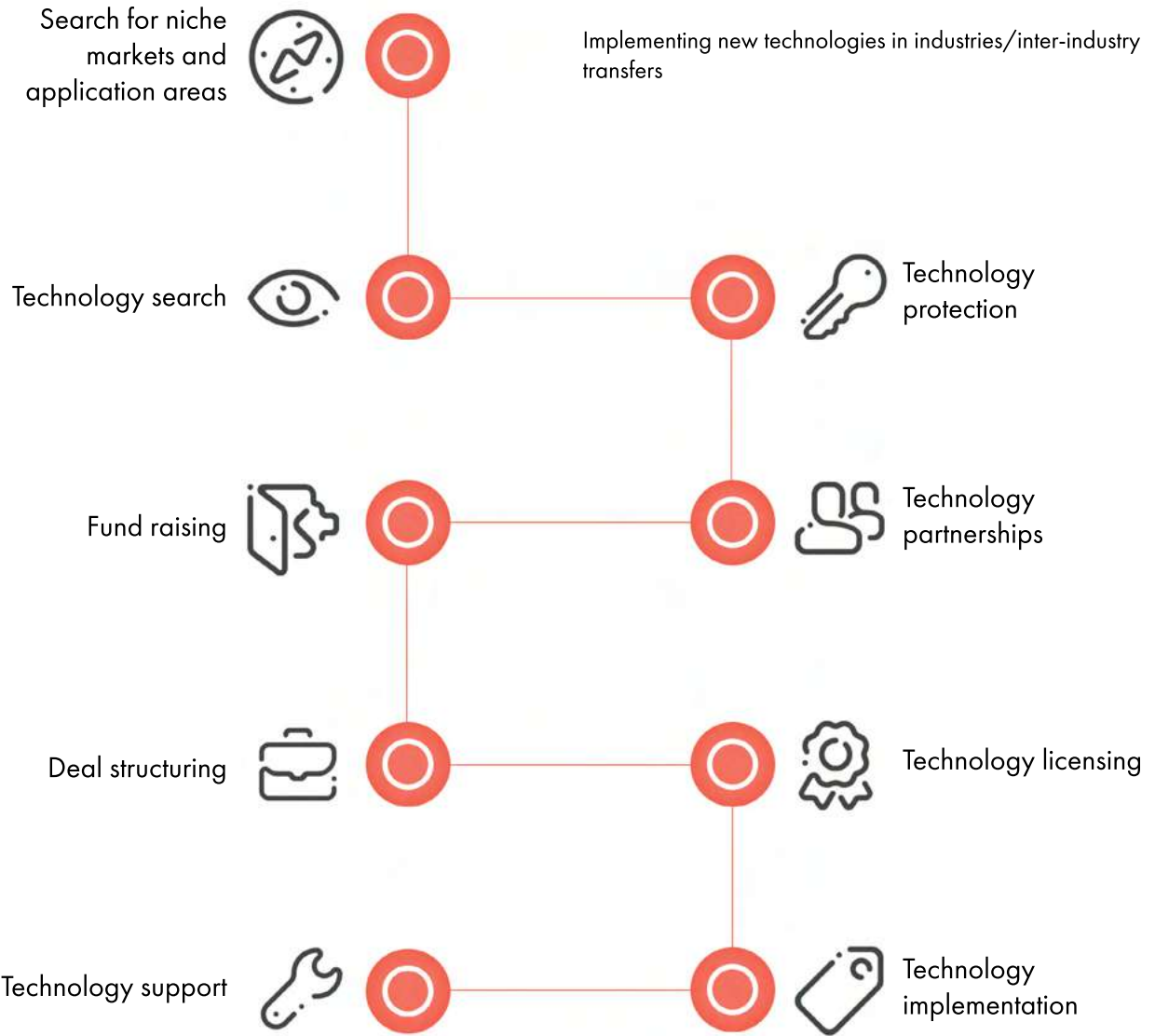
BUSINESS-MODEL

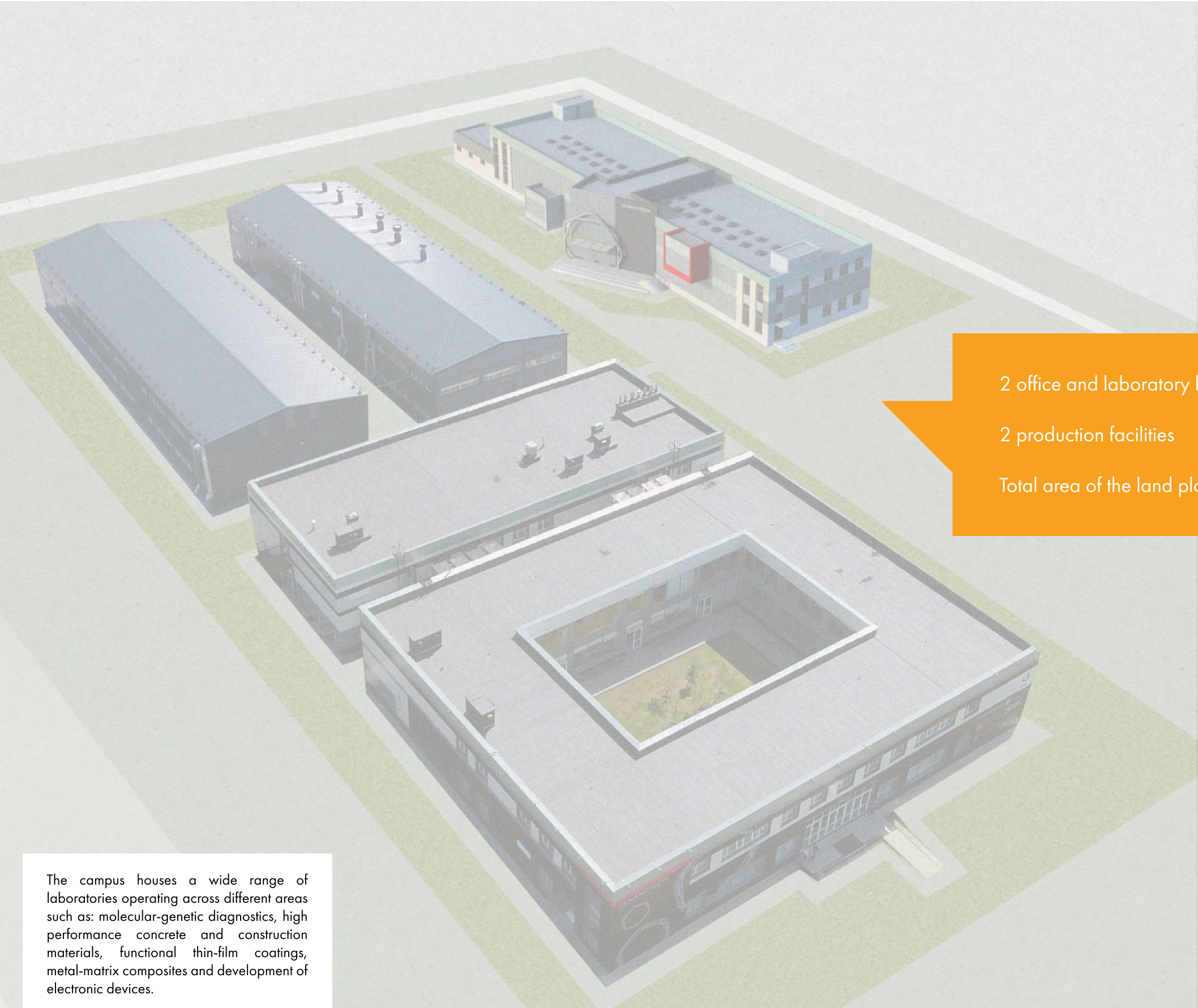
Establishment of brand-new production facilities for unique products manufacturing



TECHNOLOGY TRANSFER, LICENSING & SELLING

Implementing new technologies in industries/inter-industry transfers






WHERE
TECHNOLOGIES ARE
BORN

- 2 office and laboratory buildings
- 2 production facilities
- Total area of the land plot is 3 ha

The campus houses a wide range of laboratories operating across different areas such as: molecular-genetic diagnostics, high performance concrete and construction materials, functional thin-film coatings, metal-matrix composites and development of electronic devices.



3.05 B. Rub
TOTAL PROEQT BUDGET



1.8 B. Rub
INVESTMENT IN THE
EQUIPMENT



over **100**
PROJECTS HAVE BEEN
CREATED



AREAS OF FOCUS



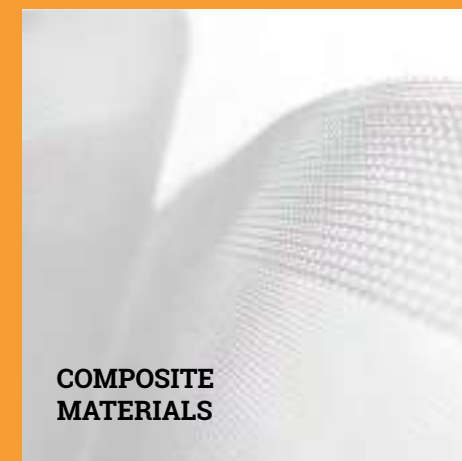
**BIOTECHNOLOGY AND
MOLECULAR GENETICS**



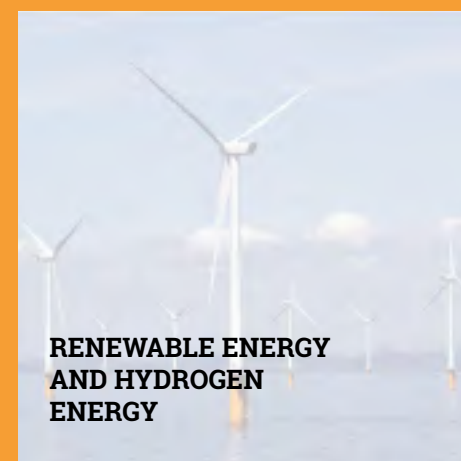
**NEW
CONSTRUCTION
TECHNOLOGIES**



**MICROELECTRONICS AND
INTEGRATED ELECTRONICS**



**COMPOSITE
MATERIALS**



**RENEWABLE ENERGY
AND HYDROGEN
ENERGY**



**THIN-FILM
COATINGS**



INVESTMENT PROPOSAL

Investors and partners are invited to scale up the technologies in production and enter new markets



R&D COMPANY FOCUSING ON DEVELOPMENT OF NEW CONSTRUCTION MATERIALS

Founded in 2013

The company is engaged in the development of new materials and technologies in construction, engineering of technology solutions and implementation of these solutions into industrial production

TECHNOLOGIES

- Water-dispersion paints and decorative coatings
- Liquid diatomite-based thermal insulation coatings
- Waterproof coatings
- High-strength concrete and low-cement concrete
- Light concrete based on high-strength keramzit
- Concrete cost reduction technology
- Drainage concrete
- Modified wood and MDF
- Electrically heated paints
- Heat-saving paints



PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

New materials and advanced technologies developed and implemented together with enhanced products featuring new properties not found in similar legacy solutions bring benefits to both economy and consumers.

MARKET

By estimate of analysts, the forecast market volume of construction materials in Russia will reach 1,201 B Rub in 2020 with an annual market growth of 2% - 3%.

ASSETS AND ACHIEVEMENTS

- Equipped laboratories set up for architectural and specific-purpose applications, finishing and construction materials
- Know-how – 9
- Trade marks - 1



Production and sale of resistant-to-the-environment street furniture with the use of high-strength concrete and modified wood.

ADVANTAGES

- Use of soft wood (birch, pine)
- Linear dimensions are unaffected by precipitation
- Modern design
- Long service life
- Free from organic solvents, additives and other harmful substances with the use of an organic binding agent
- Sustainable

AREA OF APPLICATION

- Objects and pieces of furniture installed along city streets and roads
- Construction
- Landscape design
- Interior design

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

Street furniture plays an essential part in the formation of a comfortable urban environment, combining functionality and aesthetic appeal. Objects harmonically fit and dress the surroundings – design benches, stylish kiosks and coffee places, fences made of new materials, catching the eye litter bins. Such projects give full play to unused urban areas and breathe a new life into a city.

Street furniture is one of the most competitive areas in design and architecture. The companies compete in the development of appealing and functional objects endeavoring to propose interesting solutions.

MARKET

By analysts’ estimate, manufacturing of street furniture in Russia grows by 17% annually thanks to the comfortable urban environment program.

ASSETS AND ACHIEVEMENTS

- Special-purpose equipment
- Developed product line
- Permits, certificates and testing reports
- Online shop
- Team of process engineers and laboratory assistants
- Completed orders for more than 1M Rub



INVESTMENT PROPOSAL

Investors, partners are invited to scale up the business

STREET FURNITURE

Founded in 2013





The company produces finished products from modified wood: thin board, flooring board, decking board, etc. The wood used in the product is protected from rotting in ambient conditions and does not require any annual maintenance. It is water-resistant and dimensionally stable.

APPLICATION

- Urban amenities
- Construction

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

Wood has a number of weak points: cracks easily, is moisture sensitive, dimensionally unstable in ambient conditions, easily flammable and prone to rapid decay.

DreamWood's technology enables complete impregnation of wood boards. Applied modifiers are environmentally sound components also used in the food industry. Safety and other parameters are supported by all appropriate certificates and trials.

MARKET

By analysts' estimate, the consumption of lumber products will reach 10.4 mln. m³ by 2030 with an annual market growth of 2%.

ASSETS AND ACHIEVEMENTS

- Special-purpose equipment
- Production area – 1,880 m².
- Annual production capacity – 2,280 m³
- Developed product line
- 16 dealer outlets (Ulyanovsk, Pyatigorsk, Saratov region, Samara region, Krasnodar region, Moscow region)
- Certificates and testing reports



INVESTMENT PROPOSAL

Investors and partners are invited to scale up the business



PRODUCTION OF MODIFIED WOOD

Founded in 2015



INVESTMENT PROPOSAL

Investors and partners are invited to scale up the technology in production



TECHNOLOGY FOR
PRODUCTION OF
ENVIRONMENTALLY
SOUND PHENOL-
FORMALDEHYDE-FREE
PARTICLE BOARD

Founded in 2015

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

Particle board (LDF) and MDF are primary components for economy furniture manufacturing. Conventional particleboard production technologies use binders based on phenol and formaldehyde. Phenol and formaldehyde are extremely toxic poisons that can cause a range of severe diseases (cancer, infertility, heart diseases).

The company has developed the technology that does not require the use of phenol-formaldehyde based binders. Wood chips are pressed into the board using only natural wood substances. The team uses special modifiers expanding binding properties of chips.

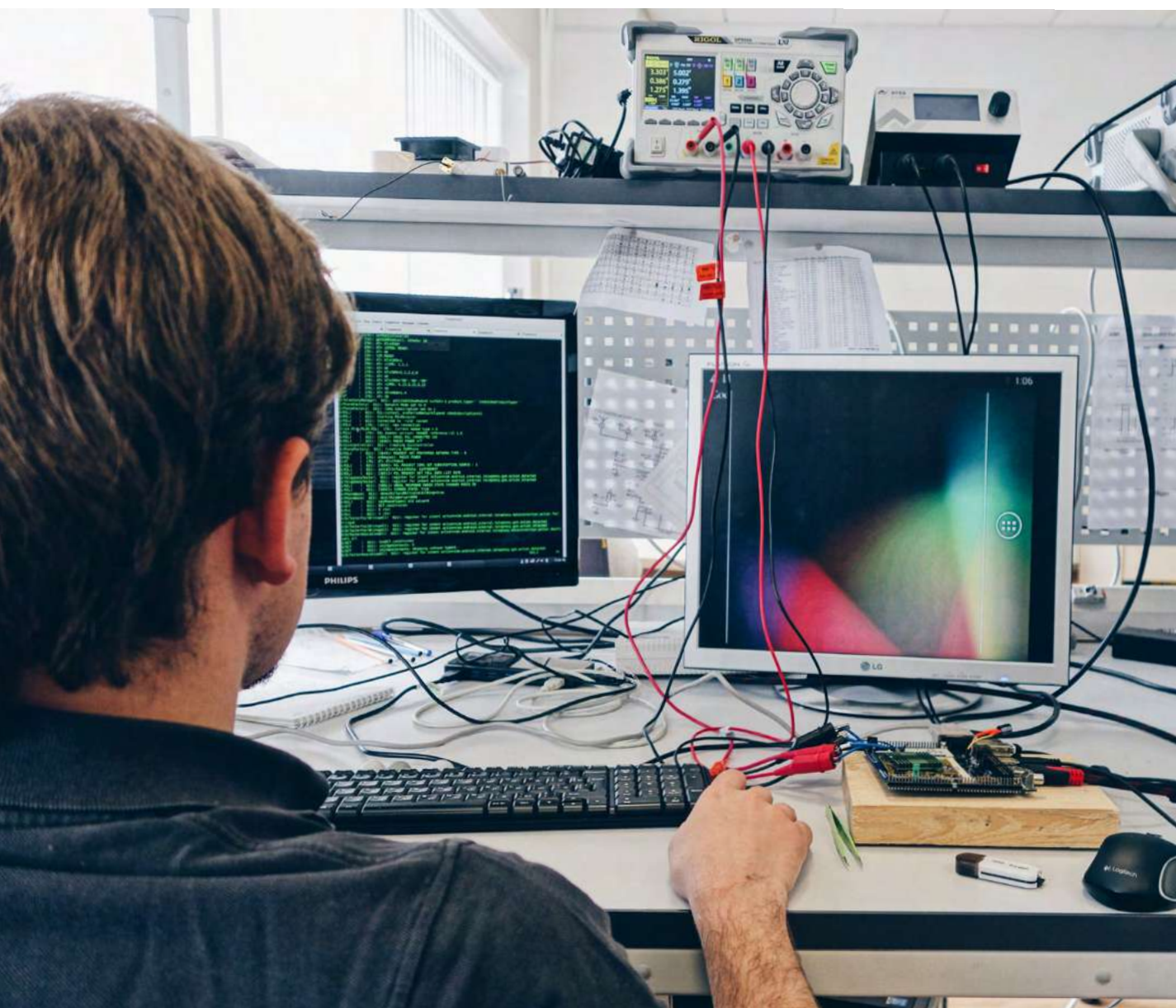
MARKET

By analysts' estimate, production of particleboard (LDF) and MDF will reach 17.1 mln. m³ by 2030.

ASSETS AND ACHIEVEMENTS

- Know-how "Environmentally Sound Wood Chip Material Technology"





INVESTMENT PROPOSAL

Investors and partners are invited to scale up the business



CONTRACT DEVELOPMENT ELECTRONIC PRODUCTS, WEARABLE DEVICES, SPECIALIZED DEVICES, IOT DEVICES

Founded in 2014

The engineering company focuses on the development of electronic devices, IoT devices, personal gadgets and customized appliances, software of various levels – mobile applications, web-interfaces, firmware, drivers.

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

The transition to Internet of Things automates routine and mitigates the impact of human factors. With digital industry data collection and analysis, companies gain access to novel information resources to help them develop new business services, measure and control various areas of activity, boost consumers' loyalty and step up operational efficiency. For instance, new technologies allow companies to cut costs through predicting emergency situations which may arise, evaluate potential failures and bring to a minimum potential downtime to save resources of an enterprise.

MARKET

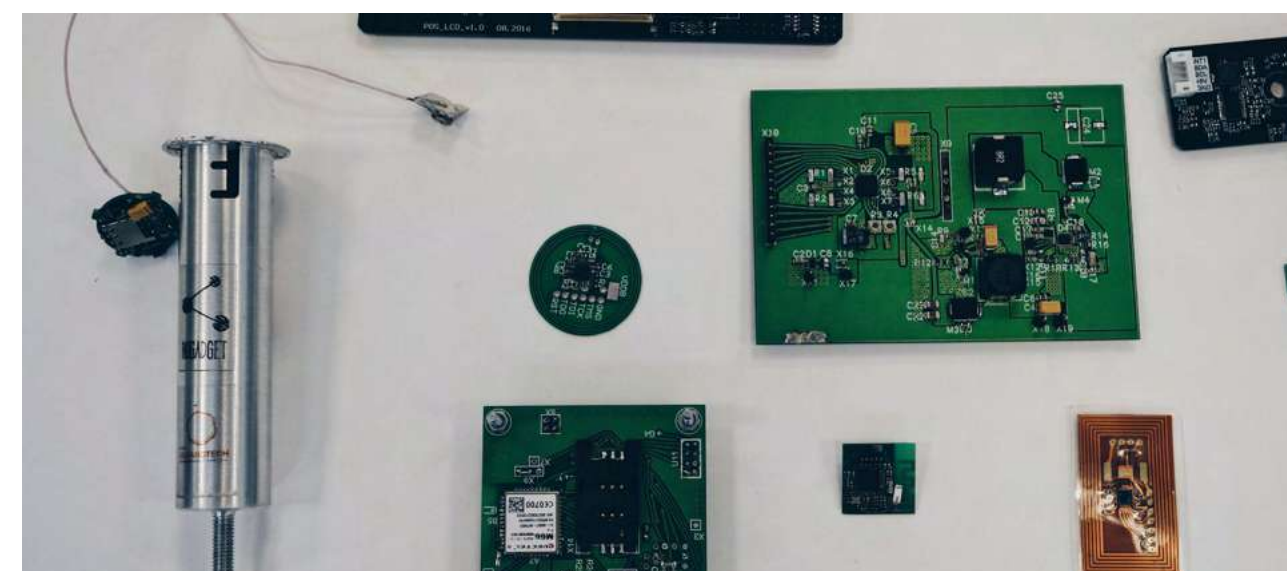
By estimate of analysts, the IoT market in 2017 reached \$170.57 B, it is projected to grow to \$561.04B by 2022.

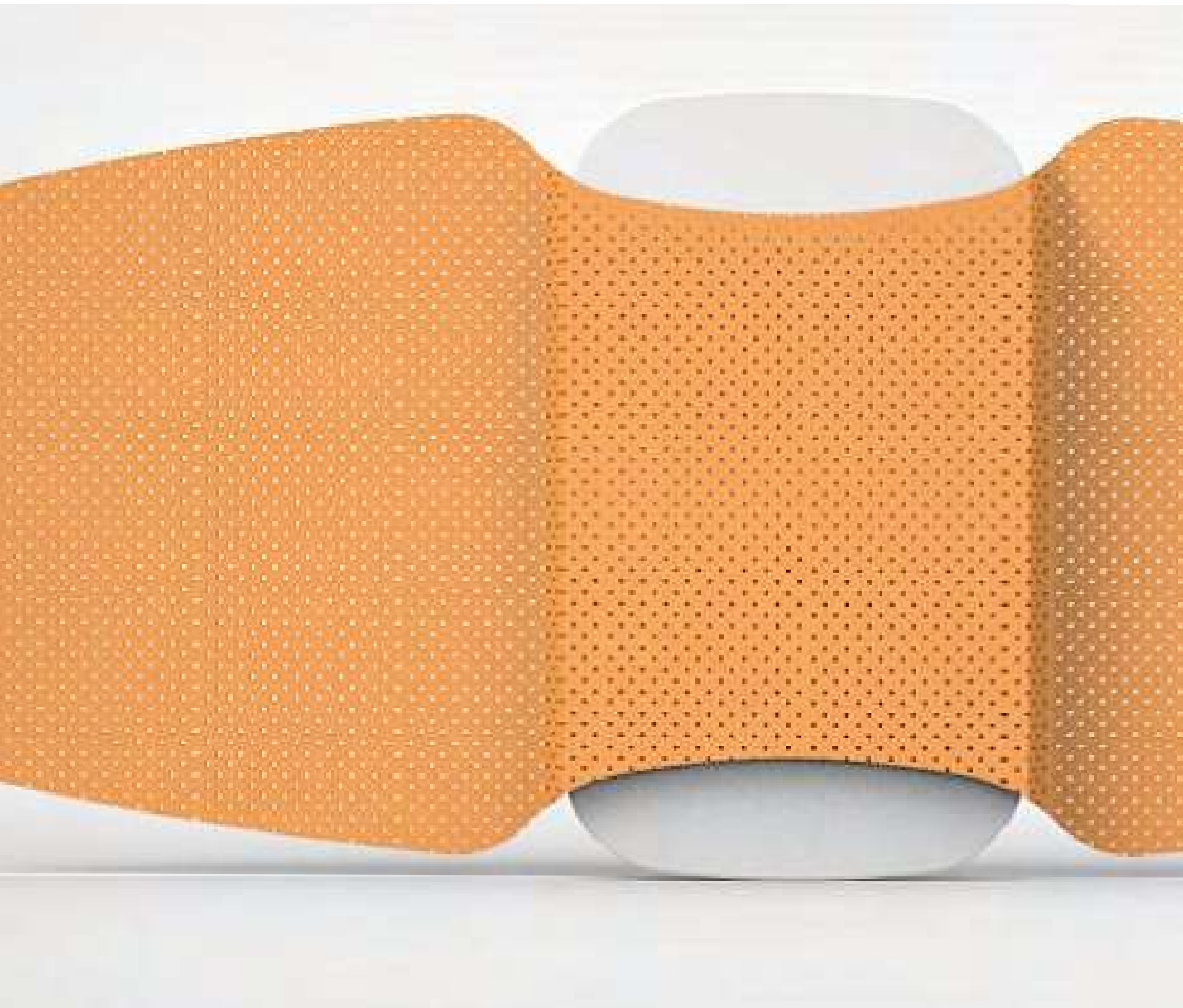
ACCOMPLISHED PROJECTS

- "Smart Home" system
- Wearable device for temperature measurement
- Embedded electronics for safes with increased level of protection
- Electronics for a briefcase with a biometric lock
- GPS tracker equipped with an accelerometer
- POS terminals
- Vending machine for printing on souvenir coins
- Prototype device for improvement of motor skills and sense of touch in patients with neurological conditions
- Inertial sensor for measurement of sled velocity and initial acceleration of a sport sled at the starting point
- Set of smart dumbbells with possibilities to measure one's fitness level
- Smart window patch for window glass condition monitoring

ASSETS AND ACHIEVEMENTS

- Purpose-built laboratory
- Team of highly-qualified engineers – schematic engineers, programmers, designers, industrial designers, project managers with experience in implementation of more than 50 various projects in medicine, industry, retail, etc.
- Trade marks – 2
- Know-how – 2
- University academic department "Internet of Things Technology"
- Total orders in hand amount to 30 M Rub





INVESTMENT PROPOSAL

Investors and partners are invited to launch the product on the market



THERMOMETER LEKKO

Founded in 2015

Portable wearable device for measurement of body temperature and data transfer to a smartphone.

The product is fabricated as a flexible plate in a silicon casing with hypoallergic transpiring patch that adheres to the body.

The patch is connected to a smartphone via Bluetooth and transfers the measured data. The device constantly records and monitors the body temperature. The measurement records are stored in the application, and can be displayed as diagrams or tables. Using this application one can set up notifications in the event the temperature is higher of the preset value.

The plan is to make this device reusable through equipping it with a rechargeable battery and providing adhesive base replacements.

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

When a baby has a high fever, it is usually a problem to measure it. The temperature patch can be placed to a baby's body, for example at night, to learn on time if a child has a fever. The patch can be used in hospitals instead of conventional thermometers. In this case, the patients' data is centrally collected and monitored in real-time mode without necessity to meet a patient for this purpose.

In contrast to existing analogues, which allow temperature measurement only at a certain time, this solution enables for continuous temperature monitoring.

MARKET

By estimate of analysts, projected sales of human-body wearable medical devices will reach \$41.3B by 2020 with growth by 21.3% as compared to 2016.

ASSETS AND ACHIEVEMENTS

- Team of highly-qualified engineers – schematic engineers, programmers, designers, industrial designers, project managers with experience in hardware and software development
- Trade marks – 1
- Know-how - 1





INVESTMENT PROPOSAL

Investors and partners are invited to scale up the business



S-HOME – SMART HOME

Founded in 2018

An integrated and seamless system designed for real-estate developers and utility providers. The system is connected to communal utility services, individual appliances on a building and apartment level and to “smart home” sensors. The system is controlled via smartphone application.

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

Most of solutions in the Smart Home system are primarily focused on the end user and are limited by the connected facility – an apartment or house. The proposed solutions do not extend to general or nearby infrastructure and are not designed for communication with service suppliers or with a utility provider.

S-Home serves to bring all services together into one software/hardware product, which could be connected to an apartment block as early as it is under construction. The services are connected to each facility on the modular basis depending on their necessity. These can be video surveillance systems, area access systems, gate control, video door entry systems, metering units, smart home devices in apartments.

The solution ensures full transparency of the processes in a utility system of a building (a software product for smartphones and PCs).

The solution is included into the Smart Home Solutions Bank and compliant with Smart City Standard of Ministry of Construction of Russia for implementation of the Smart Home pilot project.

MARKET

According to analysts, global smart home market will reach \$155B by 2023 with an annual average growth rate of 10% over the forecast period.

ASSETS AND ACHIEVEMENTS

- Team of highly-qualified engineers – schematic engineers, programmers, designers, industrial designers, project managers with experience in development of software and hardware
- Accomplished pilot project in Aquamarin Apartment Complex (Ulyanovsk)





INVESTMENT PROPOSAL

Investors and partners are invited to scale up the business

rvr:studio



PROJECT TEAM FOCUSING ON THE DEVELOPMENT OF APPLICATIONS USING VIRTUAL REALITY AND AUGMENTED REALITY (VR/AR)

Founded in 2016

MARKET

According to analysts, the market for sales of VR/ AR content and devices will grow over \$150B by 2020.

ACCOMPLISHED PROJECTS

- Application for the commercial departments of real estate developers offering the ability of 3D site tours to show apartment layouts and views from window
- Virtual marketplace with an option to view various goods such as furniture, electronics, jewelry and many others.
- Application for demonstration of business jet cabins with possibility to move around
- Application for wind turbine maintenance training allowing simulation of on-site work and malfunctions
- Application for choosing interior doors to fit in an apartment with the possibility to simulate them against the background of customers' own apartments

ASSETS AND ACHIEVEMENTS

- The team





INVESTMENT PROPOSAL

Investors and partners are invited to launch the product on the market



SAFE MADE FROM ALUMINUM MATRIX COMPOSITES WITH IMPROVED PROTECTION LEVEL

Founded in 2015

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

The need to safeguard valuables and property. Solutions incorporating biometric technology find application in the areas requiring high confidentiality while providing access to bank safes and secret data storage.

MARKET

According to analysts, the global safes and vaults market is projected to reach \$ 6.9 M by 2023 with 6.0% annual growth over the forecast period

TECHNOLOGIES

- Metal-Composite's composite plates
- StroyLab's composite concrete
- RuGadget's electronics (biometric sensors, temperature, motion, position sensors, etc.)

ASSETS AND ACHIEVEMENTS

- Commercial prototype
- Know-how – 1
- Trade Mark – 1





INVESTMENT PROPOSAL

Investors and partners are invited to scale up the business and enter markets



DEVELOPMENT AND PRODUCTION OF GOODS MADE OF METAL MATRIX COMPOSITES

Founded in 2013

The company develops and manufactures goods from hi-tech materials featuring required properties - metal matrix composites based on non-ferrous alloys and aluminum die castings ranging from simple non-ferrous alloys to complex ones filled with fibers and Al₂O₃, B₄C, SiC particles.

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

With increased requirements to product quality in aviation, aerospace, automotive industry, electric and tool engineering, there is a strong need for novel materials to address technical issues. Composite materials, despite being somewhat more expensive in terms of their initial parameters, provide significant improvements in the consumer properties of a final product. Imported composites cannot address these problems due to their high cost.

DEVELOPMENTS

- AlSiC material and AlSiC-based goods for microwave devices, hermetic hybrid DC/DC converters, IGBT modules and other semiconductor devices.
- Graphite-based materials for effective heat transfer from components of various electronic devices.
- Functional neutron-absorbing high thermally conductive MMCs to be used as functional materials in grid spacers of spent fuel pools, containers for spent nuclear fuel transportation and storage.
- Materials to safeguard safes, vaults and doors from attempted burglary
- Ultralight structural material – Syntactic Aluminum Foam. This material features record-breaking impact absorption properties
- Ceramic armor for personal protective equipment (protective shields, bullet-resistant vests) and armored vehicles

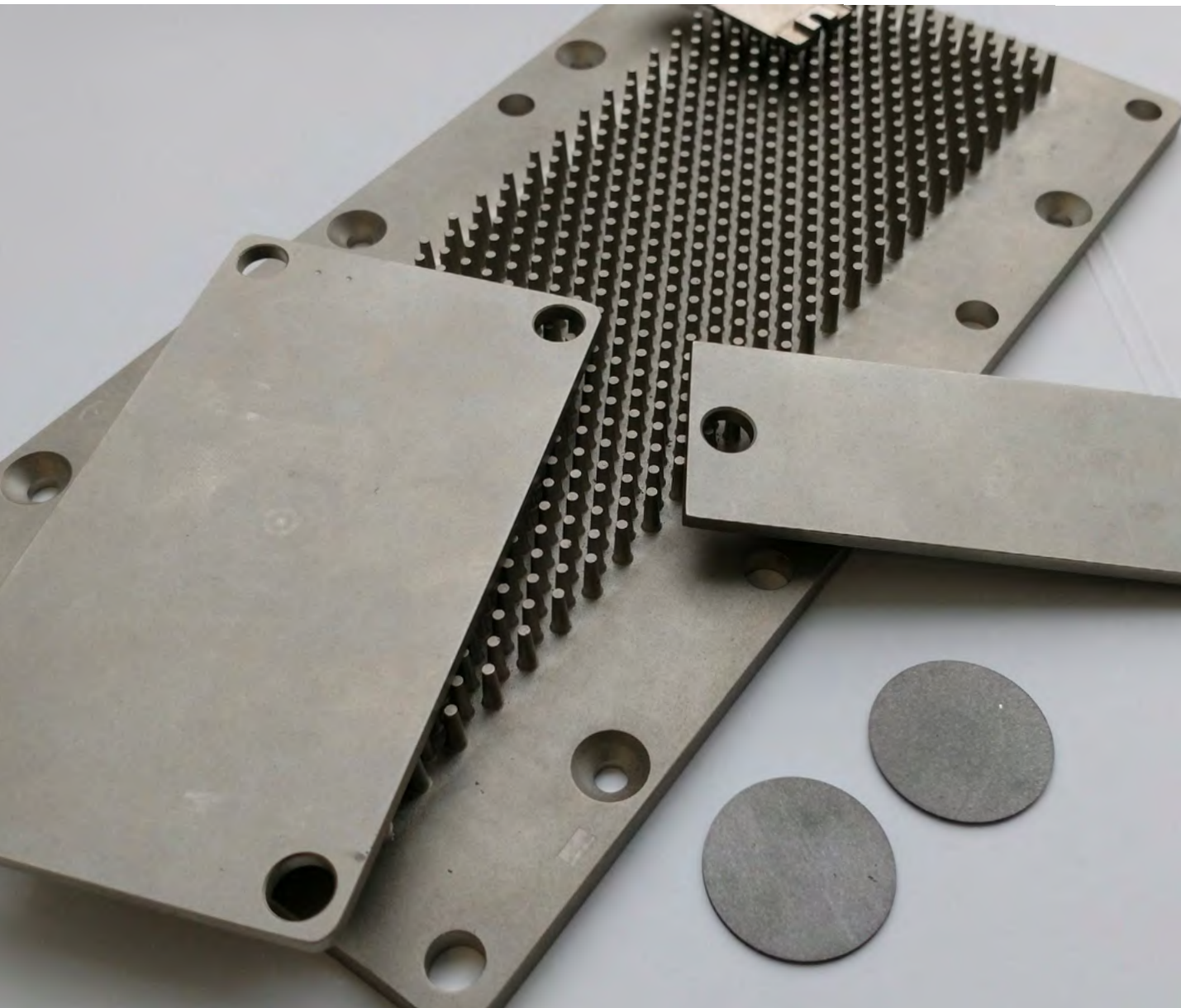
MARKET

According to analysts, the global metal matrix composites market is projected to reach \$ 431.1 M by 2020

ASSETS AND ACHIEVEMENTS

- Own production facility with separate areas for production of composite materials and conventional casting
- Analytical laboratory equipped with necessary basic equipment for product quality control, research of structural materials and product prototypes
- Thermal, press, metallurgical casting and metalworking equipment
- Team of chemical engineers, casters, metal and alloy smelters and commercial staff
- Total amount of orders exceeding 160 M Rub





INVESTMENT PROPOSAL

Investors and partners are invited to launch the products on the market

HeatLab
THERMAL MANAGEMENT

DEVELOPMENT OF COMPOSITE MATERIALS WITH TARGETED PROPERTIES FOR HEAT FLOW MANAGEMENT

Founded in 2015

DEVELOPMENTS:

- AlSiC, a composite, high heat-conductive material based on an aluminum alloy matrix and silicone carbide filler powder;
- AlGr, a composite, high heat-conductive based on aluminum alloy matrix and milled high modulus graphite fiber filler;
- High heat-conductive composites and laminates incorporating high thermal-conductive materials based on heat-treated pyrolytic graphite;
- AlB4C, a high heat-conductive radiation-shielding material based on an aluminum alloy matrix and boron filler powder.

MARKET

According to analysts, the global composites market is projected to reach 115.43 bln. USD by 2020 with a year-on-year growth of 8% over the forecast period.

ASSETS AND ACHIEVEMENTS

- Specifically equipped laboratories for Chemistry, Metallography and physical measurements
- Know-How – 11
- Trade Marks -1
- Completed orders for a total of more than 10 M Rub





INVESTMENT PROPOSAL

Investors and partners are invited to launch the product on the market

HeatLab
THERMAL MANAGEMENT

PORTABLE FUEL CELL POWER SYSTEM WITH HYDROGEN STORAGE BASED ON MAGNESIUM HYDRIDE

Founded in 2016

Magnesium hydride is considered as one of the most promising materials for hydrogen storage finding application in metallurgy, chemical technology, pyrotechnic production, rocket fuel, cosmetics, medicine and pharmaceuticals. It is used in the production of chemical hydrogen sources, hydrogen power sources and lightweight fuel systems for unmanned aerial vehicles (UAV).

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

Unmanned aerial vehicles (UAV), robotics and electronic equipment require a light, compact and high-capacity energy source.

Hydrogen fuel cells consume hydrogen to produce electricity providing 2-3 times more specific energy than Li-ion batteries.

Under normal conditions, hydrogen is an explosive gas. Hydrogen as a gas is typically stored in high-pressure tanks. There is a number of shortcomings of this approach, to name: extremely high explosive gas pressure up to 400 bar, a problem associated with tank refilling, need for oil-free compressors running at 400 bar, restrictions related to transportation and storage of hydrogen gas and the need to have a permit to work with explosive gas. The gravimetric hydrogen storage density in a lighter composite tank is 6 – 7% mass.

In order to address problems with storage and transportation of hydrogen, the company has developed a prototype **electrochemical power source with a safe magnesium hydride-based source of hydrogen**. The product offers several advantages such as explosion safety, high specific energy consumption of 500 W*h/kg, no high overpressure (less than 0.6 bar) and high gravimetric storage density of 8-9% which helps increase the operating time of energy-consuming devices. The energy generated by this system is environmentally friendly.

MARKET

According to analysts, the Russian energy storage systems market is expected to reach \$1.5B – \$3 B by 2025. The hydrogen energy systems market will increase to \$0.5B – \$2.9 B in Russia and \$30 B globally by 2025.

ASSETS AND ACHIEVEMENTS

- Know-how -4
- Trade marks -1
- Project team of engineers and research scientists
- Developed commercial prototype power source based on chemical hydrogen generator





Magnesium hydride is one of the most promising materials for hydrogen storage and compression. Contains 7.66 wt% of hydrogen.

It is used in metallurgy, chemical technology, pyrotechnic production, rocket fuel, cosmetics, medicine and pharmaceuticals.

APPLICATION

- Increase of energy efficiency
- Renewable and distributed generation
- Smart-grid
- Off-grid energy sources
- Fuel production
- As food supplements and cosmetic products with antioxidant activity for medicine and cosmetology

PROPERTIES

- Density: 1.45 g/cm³ (at 25°C)
- Molar mass: 26.32 g/mol
- Hazard class: 4.3
- CAS No.: 7693-27-8
- Preparation technique: magnesium powder direct hydrogenation, purity - at least Mg95, temperature - 400°C, hydrogen pressure - 40 Bar
- Composition: MgH₂ - at least 98-99%, the rest are unreacted Mg (about 1-2%), impurities of metals and nonmetals typical for Mg95 (less than 0,05%)
- Granulometry: on request for cosmetic use 0.1 - 5 microns.

MARKET

There is no magnesium hydride production in Russia, foreign suppliers offer their products at prices from \$ 700 to \$ 1,500 per kg.

ASSETS AND ACHIEVEMENTS

- Patent - 1
- Project team of engineers and research scientists
- Developed effective magnesium hydrogenation technology
- Designed and manufactured pilot plant for the magnesium hydride synthesis
- Developed product line



INVESTMENT PROPOSAL

Investors and partners are invited to scale up the business

HeatLab
THERMAL MANAGEMENT

PRODUCTION OF MAGNESIUM HYDRIDE

Founded in **2016**



INVESTMENT PROPOSAL

Partners are invited to invest in equipment production
localization and launch pilot projects



RES-BASED AUTONOMOUS HYBRID POWER GENERATING SYSTEMS

Founded in 2016

Hybrid power systems using renewable energy sources (RES) are designed to provide energy supply to facilities including those isolated from Unified Energy System of Russia.

The share of RES energy generation in these systems may reach 80%. Hybrid power varies from 50 kW to megawatt solutions. The equipment used in hybrid systems is operable at temperatures ranging from -40 C to + 50 C.

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

Energy supply to remote areas is the responsibility of municipal governments and energy companies. Fuel, electric and thermal energy prices in Russian stand-alone energy supply systems are the highest in the world with electric energy tariffs of up to 20 – 237 Rub/KW*h.

Municipal budgets are the main source of funding. One option to cut down costs lies in the construction of power generation facilities independent of fossil fuels i.e. stand-alone RES-based hybrid power systems.

MARKET

According to analysts and experts, this market is classified as emerging and expected to reach 2-3 B Rub annually by 2025.

ASSETS AND ACHIEVEMENTS

- Exclusive representation of the solutions developer in Russia
- More than 5 years of global experience
- Exclusive dealer agreement signed with Freqcon (Germany) for mutual marketing and sale of Freqcon package solutions for isolated areas, energy storage systems and converters for wind turbines in Russia.





INVESTMENT PROPOSAL

Partners are invited to invest in equipment production
localization



MANUFACTURING OF 100KW AND 300KW WIND TURBINES

Founded in 2016

Wind turbines with a capacity of 100 kW and 300 kW to be operated in cold climate are primarily designed for the use in remote and inaccessible areas where connections to utilities are either very expensive or impossible altogether. These wind turbines are the most feasible solutions for remote areas due to ease of transportation in containers and crane-free installation technology.

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

Cost savings achieved for energy generation in the Arctic, Polar North and Extreme North. There are a large number of stand-alone energy systems concentrated in these areas so this represents quite a challenge for Russia. The need to maintain diesel supplies drives up energy costs in these regions.

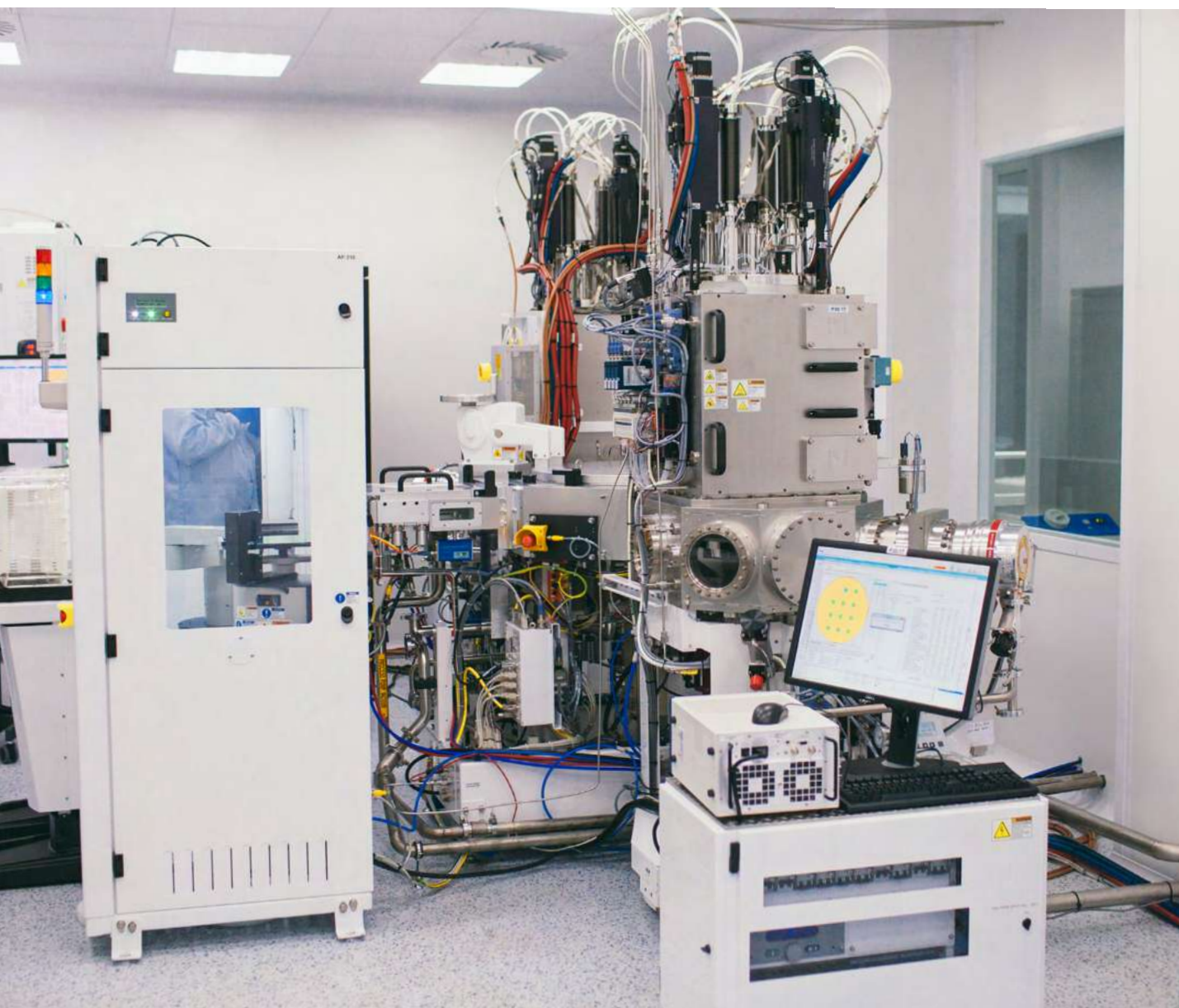
MARKET

According to analysts and experts, the market is classified as emerging and expected to reach 700 M Rub annually by 2025.

ASSETS AND ACHIEVEMENTS

- Exclusive representation of the solutions developer in Russia
- More than 5 years of global experience
- Operating experience in Alaska





INVESTMENT PROPOSAL

Investors and partners are invited to scale up and pursue the further development of products and technologies



FAST CREATION MULTIFUNCTIONAL THIN FILM COATINGS PVD METHOD

Founded in 2014

The company performs the full cycle of development and production of thin-film devices, including materials screening and R&D, engineering and prototyping of devices, pilot and industrial production, integration into customer applications, delivery of ready-made solutions.

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

The Comberry technology platform which combines process and analytical equipment, software and the HPC® technology developed by Intermolecular, Inc. makes it possible to conduct hundreds of experiments simultaneously whose results are studied promptly thanks to special analytical methods which determine and single out the materials and processes that are most promising for fabrication of integrated devices.

The platform ensures that scientific results from the labs are scalable for production.

The combinatorial technology in conjunction with a top-notch team of experts accelerates research cycles and increases their efficiency, which in turn contributes to cost efficient and seamless implementation of innovative solutions for mass production.

MARKET

According to analysts, the global interior and architectural glass market will reach \$11M by 2022.

ASSETS AND ACHIEVEMENTS

- Highly professional team of engineers-developers, chemist engineers, specializing in in electrochemistry and solid-state physics and experienced BDOs
- Effective and unique platform for combinatorial R&D allowing for super-fast deployment and completion of contractual research projects
- Set of unique IP and technologies ready for upscaling
- Trade marks – 2





Electrochromic glass consists of layers of glass and various chemical materials. It is used in architecture and production of transparent units (windows, walls, doors, etc.). The optical properties of the glass alter in response to changes in light or temperature, or when voltage is applied.

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

The most important property of electrochromic devices is their ability to change light transmission in response to voltage.

Electrochromic glass changes its transparency enabling control of the amount of light and heat penetrating into the room. That kind of glass is widely used in construction, interior design and automotive industry.

The major factors inhibiting development of electrochromic coatings market:

- High production costs of about \$400-\$450 per 1 sq. m.
- Limited light transmission range (a difference in transparency between colored and bleached states) of at least 45-50%
- Limited choice of colors (mostly blue)
- Low switching speed between colored and bleached states (up to 10 minutes)
- Current engineering solutions are suitable only for companies that operate in "full cycle" mode - from application of electrochromic coating on glass and production of insulated glass units (IGU) to installation.

MARKET

According to analysts, the global interior and architectural glass market will reach \$11,000M by 2022 while the thin-film energy storage market will increase to \$1.1B.

ASSETS AND ACHIEVEMENTS

- Highly professional team of engineers-developers, chemist engineers, specializing in electrochemistry and solid-state physics and an experienced BDO
- Effective and unique platform for combinatorial R&D allowing for super-fast deployment and completion of contractual research projects
- Set of unique IP and technologies ready for upscaling
- Patent application – 1
- Prototype new-generation electrochromic glass able to change light transmission properties in response to voltage with a wide range of light transmission between colored and bleached states of up to 80%



INVESTMENT PROPOSAL

Investors and partners are invited to scale up the technology.

LOW-COST ELECTROCHROMIC GLASS MASS PRODUCTION TECHNOLOGY

Founded in 2014





The widening range of applications of IoT-technologies drives the critical need for powerful and small-size energy storage systems. Thin-film pseudocapacitors with their unique features like fast charge time and almost infinite number of charge-discharge cycles, being integrated with energy harvesters and batteries, have a great chance to become a crucial element of such systems.

PROBLEMS IN THE MARKET ADDRESSED BY THE PROJECT

The main constraints for miniature IoT applications is lack of mass production of thin-film batteries available on the free market. All available batteries and supercaps have limitations as they cannot withstand low and high temperatures, have small capacity, etc. The developed thin-film all-solid-state pseudocapacitors owing to their unique properties (ability to charge quickly, operate in extreme temperatures from -40°C to $+150^{\circ}\text{C}$, a very large number of charge-discharge cycles) can be used in a wide range of wearables, medical equipment, IoT devices.

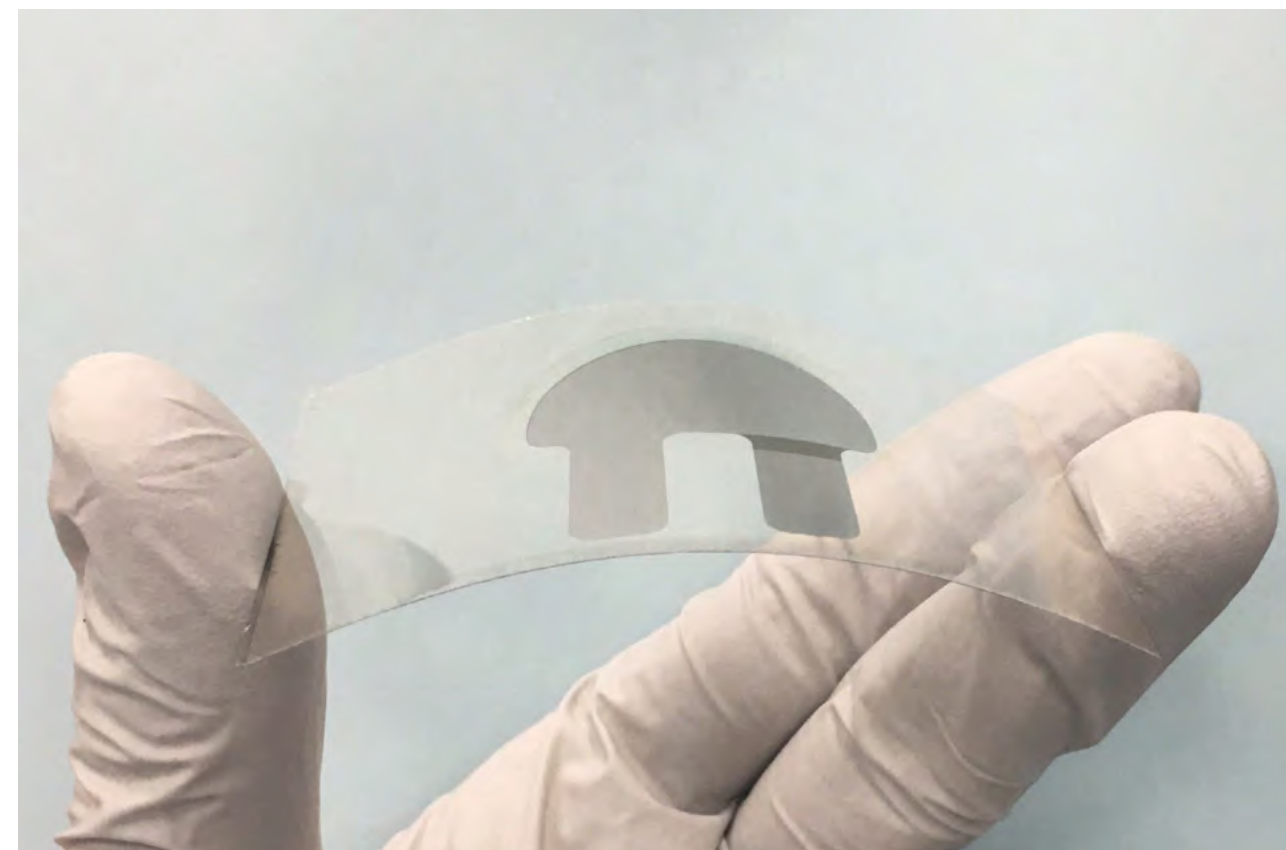
Pseudocapacitors can be integrated in a smart tyre sensors system to act as a source of power supply.

MARKET

As estimated, the thin-film energy storage market will reach \$1.1B by 2022.

ASSETS AND ACHIEVEMENTS

- Team of highly-qualified, world-class R&D engineers
- Unique technology ready for upscaling (patent application)
- Trade mark – 1
- Developed prototype device, a contract for development of a production model



INVESTMENT PROPOSAL

Investors are invited to upscale and further develop the products and technologies.



THIN-FILM PSEUDOCAPACITORS FOR A SMART TYRE POWER SUPPLY AND OTHER IOT DEVICES

Founded in 2017

85 MW WIND FARM

As a result of joint collaboration of the Ulyanovsk region Government, ULNANOTECH nanocenter and Altren, Fortum was attracted as an investor to construct the first commercial wind farm in Russia.

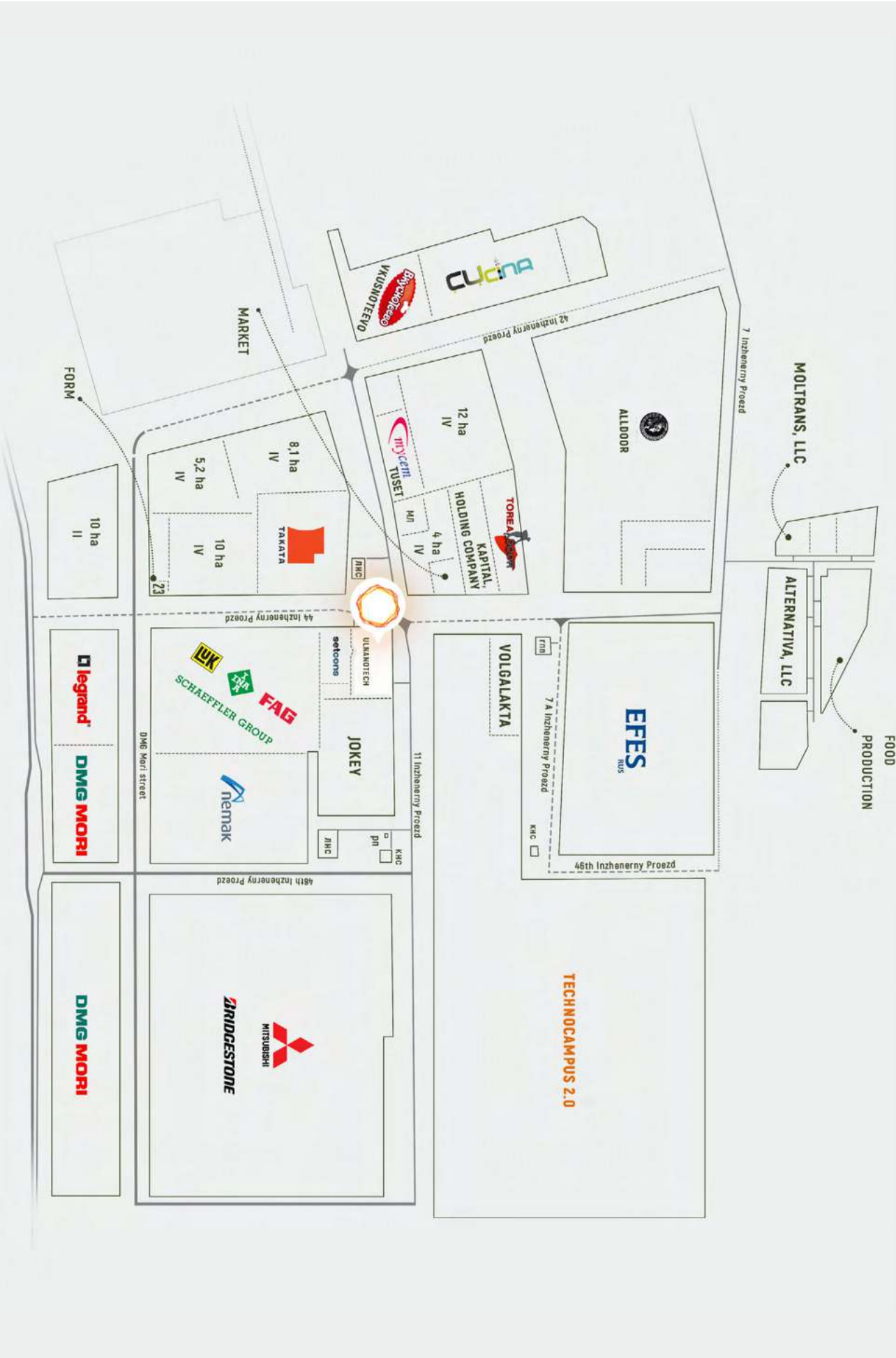
Fortum, a Finnish energy corporation, invested around €65 M in the construction of the first wind farm. The first wholesale wind farm was put in operation in 2018

In December 2018, Vestas, RUSNANO, Consortium of Investors of the Ulyanovsk region and the nanocenter launched a wind turbine composite blade production facility in the Ulyanovsk region unparalleled in Russia.

In 2019, the Investment Fund for Wind Energy Development, created by Fortum and RUSNANO, launched the second 50 MW capacity wind farm.

The total capacity of the wind farm in the Ulyanovsk region has increased to 85 MW in 2019.





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ULNANOTECH

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Companies, corporations, investment foundations,
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