

## Our Company

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### **Nanotec-USA - a global distribution and services operation**

Nanotec-USA ranks among the first Nanotechnology and bionic engineering companies in the USA. In 2005 it established the product line of NanoBionics. In 2006, Nanotec-USA signed a shared technology agreement with a major laboratory to establish a working relationship between the USA and Germany. By combining our technologies and further development of this product line, along with a firm basis in Nanotechnology and bionic engineering built over decades, have helped Nanotec-USA to successfully bring exceptional nanobionic products delivering strong benefits in their everyday use to the market.

Nanotec-USA with their sister company in Germany currently engineers more than 120 different NanoBionics products for the treatment of diverse surfaces. The range is divided into four quality grades: consumer, commercial, industrial and aerospace. The products are particularly valuable for refining industrial surfaces such as facades or glass, and in easy-to-clean and self-cleaning treatments for vehicle windscreens, paintwork, wheel rims or kitchen surfaces made of stainless steel, etc. The company headquarters is located in the Washington D.C. Metro area. Having the shared technology agreement with their sister company in Germany, a group has evolved which includes 10 other companies which have specialized in sales and services on a worldwide level.

With the launch of the new service providing system, the products have found the perfect placement with professional users, as in Nanotechnology applications in the areas of vehicle finishing, aviation fuel savings and safety, refining and customizing, anti-corrosion for steel, anti-oxidation to various metals, glass reconditioning and refining, Yacht and Kitchen refinement and much more. Around 100 distribution partners and licensees have already been established in this market worldwide. The group engages over 800 Specialists throughout the world

## Business area

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Nanotec-USA is a leading company in the following nanobionic applications and products: nanobionic coatings, hydrophobization and paints for all material surfaces with non-adhesive and dirt-repellent properties, scratch-proof systems, easy-to-clean surfaces, hydrophilic surfaces, anti-corrosion systems, bionic self-cleaning systems, UV-resistant surfaces, weather-resistant surfaces, temperature-resistant systems, anti-fingerprint systems, abrasion-resistant surfaces, graffiti-protection systems, calcium and lime-resistant surfaces, wear-resistant systems, anti-corrosion, anti-oxidation, permanent impregnation, permanent seals and combinations of several properties simultaneously.

### Production and Development

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Our products are manufactured in accordance with the latest EC directives; production and development are subject to special quality control procedures. The products we develop undergo very vigorous endurance testing in our laboratories. We work with specialized test institutes on new test procedures for nanobionic products. Products which do not pass these tests are not approved for production. Perfect product quality is of utmost importance to us. Our nanobionic products, the cleaning systems and application processes undergo constant further development in order to guarantee our position as worldwide leaders in the nanobionics market.



Our field of activity consists of the development and production of functional, nanobionic coating systems. Experienced staff guarantees perfect solutions for our customers' problems. Product development takes into account the latest scientific findings and is carried out on schedule and costed appropriately.

We offer industrial customers, specialist dealers and end users a comprehensive product development service. Product development consists of preliminary planning, sample testing and approval, and application of the product in the customer's industrial production facilities.

### Customized product finishing

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The process of developing a new product represents another core competence of our company. Particular emphasis is placed on the development of materials, and on the production of new nanobionic formulations and of the customer's products for finishing. The challenges here are in developing reasonably priced and reliable low-cost process engineering and in creating the required surface quality: ultra-thin, highly durable layers which do not alter the basic properties of the original surface. There are various processes available that allow us to integrate optimized nanobionic formulations in customers' applications.



### Silicium for nanobionic products

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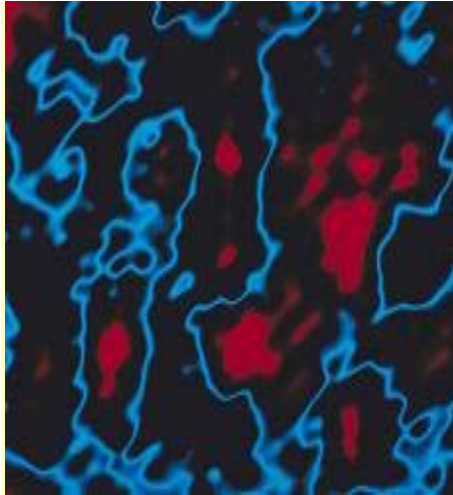
We have chosen to use Silicium in our products for several reasons. The deciding factor, however, was the fact that products containing Silicium are not harmful to humans. Furthermore, Silicium is available in sufficient quantities worldwide and is very robust, which allows excellent material properties to be developed. Our glass coating, for example, lasts for 10 years. Silicium is very temperature and abrasion resistant. The products are easy to apply and exceptional functional properties come to light after the application. The Silicium particles create an open, porous, nanorough lattice structure with longitudinal and cross connections. This combines on a molecular level with the material surface, creating a bionic surface which cannot be felt by humans and is similar to the surfaces of leaves and plants. However, it is very much more stable and resistant than Silicone, siloxanes, polymers, waxes, oils, paraffins, fluorocarbonates and paints. Products, materials, and surfaces which are coated with our nanobionic products have longer life expectancy, can be used for longer periods of time, remain stable for extended periods, have a more attractive appearance and shine, are easy to clean or even self-cleaning. The coating is also scratch-resistant and non-stick.



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### The Sol Gel Process for Nanotechnology and Bionic Engineering

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Thanks to our special, proprietary development of a sol-gel process we are able to produce a nanobionic fluid. Silicon is stabilized in solution in this nanobionic fluid. A further conversion with inorganic-organic hybrid substances, modifiers, stabilizers, or activators allows a wide range of chemical variations. This specially developed sol-gel process represents a low-cost alternative. Bionic surfaces are modeled using the nanobionic fluid. These thin bionic layers are important for modifying the surfaces of substances and products, as they improve existing usage properties and extend product life. In the sol-gel process, nanostructured materials are manufactured systematically with controlled reactions between different basic materials in a special sequence of processes.

Typical materials used in the sol-gel processes are alcoholates, silanes or salts which can undergo controlled reactions in solution, by varying the pH-value or by adding more solvents, for example. Nanoparticles are particles which consist of a small number of molecules. With controlled changes to the processes, the nanoparticles can develop into particles or structures with different functions. It is possible to manufacture different functional structures with different physical properties. By introducing molecular structures with specially adapted charge carriers or appropriate chemical functionalization, or by introducing molecular bonds, the particles created can be stabilized in the solvent and their further growth controlled. Further, it is possible in subsequent stages of processing to integrate modified nanoparticles in the already nanostructured material to allow more functions and supplementary applications later on.

### Colloid chemistry

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Colloid chemistry is a branch of chemistry involving research into the manufacture, characterization and modification of certain systems. Processes used in chemical nanotechnology include those colloidal processes in which the reactions in which particles are created (e.g. chemical precipitation or separation reactions) generate very small structures in liquid starting substances.

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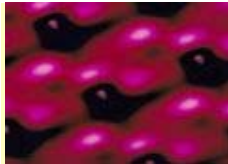
## Nanobionic Composites

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Nanotec-USA refers to the nanostructured materials which arise from the processes of chemical nanotechnology as nanobionic composite materials. These nanobionic composite materials consist within their chemical generation processes as basic substances composed entirely of organic and inorganic compounds, which build a lattice of longitudinal and cross connections on the material surface. This arrangement of particles allows us to create a surface similar to that of the lotus plant.

## Nanobionic Materials from the Sol-Gel process

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Using nanobionic composites we have manufactured in the sol-gel process which we developed specially, we create precise nanoscale structures resulting in improved material properties. This area of nanobionic technology is the most advanced and enables us to devise special solutions which can be applied across a very wide range of sectors.

## Nanobionic Formulations

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Subjected to further processes with auxiliary and supplementary materials, additives, activators and stabilizers, the nanocomposites produced with the chemical processes become usable material systems and allow changes to provide the high quality demanded by our customers.

## Nanobionic Technology

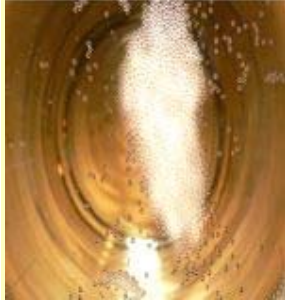
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Nanobionic Technology (“nano” – particle size and technology and “bionic” – biology and technology) is a new high-tech technology. It relates to the research, processing and production of materials and structures which measure a maximum 100 nanometer (nm) in one dimension. A nanometer is a billionth of a meter ( $10^{-9}$ ), or a millionth of a millimeter and approximately 50,000 times finer than the diameter of a human hair. The extremely small size of the nanoparticles or the nanostructure is one of the main reasons for their special properties. The surface area increases overall with the application of the nanoparticles. For this reason, nanostructures have a very large surface area which has a considerable affect on their behavior. Nanostructures are therefore situated in a very small size range, in which the surface properties play a very large part by comparison with the properties of the material volume. However, the special properties of these tiny structures do not depend entirely on the nature of initial material, but on their shape, size and the way in they are created and applied to the surface. At the same time, the nanobionic structures must enter into a chemical-molecular bond with the fabric or structure of the material.

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### General surface functions

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- **hydrophobic or oleophobic** (water or oil repellent)
- **hydrophilic or oleophilic** (attracted to water or oil)
- **phobic/philic** (multifunctional coating, repels water and has a strong attraction to water).

Every material and every surface has a specific surface energy. Basically, we can affect every material surface using its response to moisture. For example, the surface can repel liquids or attract them or do both at the same time. There is a fundamental distinction in water-based media between hydrophobic (water-repellent) and hydrophilic (attracts water) surfaces and in oil-based media between oleophobic (oil-repellent) and oleophilic (attracts oil) surfaces. We can manipulate the surface energy to make specific changes to the surfaces. Our product NanoBionics Phobiphil, for example, was created on the basis of this finding. The product combines both effects at the same time. Variable surface energy systems combined with several properties (multifunctional functions) will become increasingly important in the future.

### Chemical Nanotechnology

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Chemical nanotechnology is a small branch of nanotechnology which is concerned with the manufacture and processing of nanomaterials or nanopowders. In chemical nanotechnology, initial materials with special properties are combined with each other in chemical processes in order to create the required material and surface property. The first attempts to develop colloids were made at the beginning of the last century. These are materials with finely distributed particles and represent one of the important foundations for chemical nanotechnology.

Colloid chemistry is a branch of chemistry researching the modification of chemicals in liquid form. Colloidal processes play a significant part in the processes used in chemical nanotechnology, particularly those in which nanostructures are created in liquid initial substances with the creation of particles (e.g. by chemical precipitation or separation reactions) The tendency of these materials to agglomerate presents a particular challenge to industrial application. Our special sol-gel process, for example, represents an expedient process for perfecting chemical nanotechnology.

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## Nanobionic products

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Nanobionic products are intelligent, dirt-repellent, ultrafine and breathing coatings. Tiny particles bind with the surface with dual functionality. The nanobionic coatings are durable and can only be destroyed mechanically. On the outward side, the bionic particles form a non-stick layer by reducing the surface tension. It is therefore very easy to remove dirt.

Our nanobionic coatings breathe, are extremely robust, UV-stable, scratch-proof, abrasion-resistant, temperature-resistant, retain their gloss and their color, are resistant to chemicals, are easy to clean, bionically self-cleaning, bionically dirt-repellent; they are even available with anti-adhesive properties. Nanobionic coatings are specially designed for the material surface and the material composition.

Nanobionic coatings are not visible. The nanoparticles must be “formulated” according to the surface structure. It is important that the bionic nanoparticles adhere to the surface. Our scientists achieve these effects thanks to their in-depth expertise in materials science, surface technology, nanotechnology and their bionic engineering competence. When applied, the nanobionic product is environmentally friendly, and is based on water or alcohol.



### **NANOBIONIC PRODUCTS do not contain:**

- SILICIUMES, WAXES OR OILS
- PETROLEUM DERIVATIVES
- SILOXANES
- PETROLEUM DERIVATIVES
- LONG-CHAINED POLYMERS
- FLUOROCARBONS
- ACRYLICS
- PARAFFIN

## Industrial Applications

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In order for a nanobionic coating to be applied, the surface must be completely free of any deposits of grease, oil, tensides, wax, adhesive and Silicium. In practice this means that there must be no deposits to have a detrimental effect on the bond. We have developed special cleaning systems and cleaning products so that our nanobionic products achieve a perfect bond. There are specially trained staff and expert coating companies available for the professional application of nanobionic products. Nanobionic layers are applied by spraying, rolling, rubbing or dipping.

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## Application technology and process support

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With our expertise in nanobionics and our trained experts in many different industrial market segments we are able to support our customers with customized applications and processes, achieving for them the best possible functional surfaces with our products. Materials science and biotechnology represent important mainstays in nanobionics along with product and process engineering.

Using chemical nanotechnology, Nanotec-USA combines organic and inorganic materials with the many and varied properties of nanobionic materials. This allows us to apply tailor-made product combinations to the surface of our customer's products. We harness our knowledge of procedures and processes in colloidal chemistry and sol-gel chemistry in order to build nanostructured bionic materials which subsequently enter into our customers' products and processes.

## Manufacturing

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Standard goods, special products, sample quantities or the fastest delivery to our customers worldwide, our production processes allow us to respond flexibly to our customers' requirements. We supply only high quality products. With different quality levels for our products, different batch sizes, packaging design, application systems, designer bottles and spray systems, we are able to respond to our customers' market requests flexibly.

## Quality management

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Producers of quality products must rely on the quality of their suppliers, of the application technology and products as much as on production procedures. We offer consulting and support services in these aspects and develop, document and safeguard the finishing processes. Production and product quality are of primary importance to us.

## Value added

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With our products, we can alter the properties of basic materials, create special effects or bring about completely new functions. This increases returns per unit, functionality and market value considerably. We support you with our expertise, our knowledge of nanobionics and our wide and varied range of products from the initial idea to successful product marketing. We can refine any material surface: metals, plastics, wood, concrete, stone, ceramics, glass, textiles or paint. Our products ensure higher productivity and better marketing opportunities in the industry. Innovative product solutions facilitate the daily routine for consumers in the most varied market segments. This results in a constant demand for nanobionic products.



#### Technical and application consulting services

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Before applying our products, we not only consider the material surfaces and products that you want to finish, but also the production processes, the employees, the nature of your finishing processes and the options for application in your production system. This results in the best products and application solutions. We advise you and support you personally in the application of our products. We continue to do this until the system is fully optimized - function times, processing windows, coating techniques, product suitability and application times are important criteria for the perfect deployment of our products.

#### Center of competence

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We are able to draw on additional strengths and competence that are not available from all manufacturers, namely our own research establishment for the solution-driven application of the products we develop. This is where our experts work closely with industrial companies, and discover surprising new uses for industrial processing with our products.

In the Nanotec-USA Center of Competence, customer-related development for process and product integration, in some cases with external experts, is continued on through to mature, series-ready product applications. In these areas, Nanotec-USA is able to conduct exhaustive prototyping and special surface finishing for high and low volume production. Projects are supported from the pilot phase to serial production. The Nanotec-USA Center of Competence is therefore an important component in our company, overseeing rapid integration of processes and products in serial applications. Nanotec-USA also develops and optimizes its own processes for its applications. The process allows the best quality with maximum flexibility. Our customers also profit from optimized costings and application safety. This is where high-performance functional coatings for a wide range of different materials are optimized and integrated in the production process. In wet chemical process functions, liquid organic and inorganic coatings, based on solvents or water, are applied to a surface and then cured. Typical procedures used here are spraying, dipping, drenching, blade coating, rolling, and painting. Curing is carried out in a range of temperatures from 50 °F-482°F (10°C-250°C)

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## Training courses

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At our Center of Competence you can receive professional training in the application of our products from our staff. We are happy to pass on our knowledge to you. Courses can be held at one of our facilities, or on site on your premises.



## Environment and Health

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By using Silicium and non-toxic additives in nanobionic products we ensure that there is no negative impact on the environment or on health. We add bitter denaturing agents to our products voluntarily to ensure that children and adults cannot swallow them. Silicium is present in almost every material; in fact, human beings also consist in part of Silicium. There are even medicines that contain Silicium which can be used without restrictions or side effects. We prefer not to use aerosol cans; firstly, they are pressurized and secondly, they use dangerous gases and are usually explosive. The aerosols they spray out can also enter the lungs. Aerosols are easy to use for application, but damage the ozone layer. It should be noted that an empty aerosol can constitute residual waste.

As a leading nanobionic technology company, it is very important to us to act responsibly regarding society and the environment. For us, acting responsibly means using opportunities for nanobionic technology in sustainable innovations.

We create and safeguard jobs when we facilitate competitive advantage for our customers and their products, while making the most of our own growth opportunities at the same time. Acting responsibly also means according quality and product safety a strong significance in our corporate policies. Our company is concerned with estimating the consequences of technology on different levels in many varied segments and views opportunities and risks in the same way. Product safety plays a very important part here. We regularly monitor a wide range of measures and company-internal regulations and standards. We are guided equally by legal specifications and customer requirements to ensure the quality, compatibility and harmlessness of our products. In addition, we also cooperate with well-known, independent test centers, institutes and laboratories in order to make our products as safe as possible.