



## **Nanogate-Technologie®**

Nanotechnology (“nanos” is Greek, meaning “dwarf”) means researching, processing and producing objects and structures which are smaller than 100 nanometres (nm) in at least one dimension. A nanometre is one billionth of a metre ( $10^{-9}$  m) and approximately 50.000 times finer than an average human hair. The minute size of nanoparticles or nanostructures is one of the main reasons behind their special properties and the opportunities offered by the technology. Nanotechnology is a cross-sectional technology which can be used for a variety of sectors and products and already influences many aspects of life today.

With Nanogate-Technologie® – a combination of chemistry and materials sciences which also incorporates product and process engineering – Nanogate has a high-performance platform for putting this potential to practical use. With a broad technology portfolio to draw on, Nanogate is skilled at developing composites using chemical nanotechnology and integrating subsequent nanoformulations into the respective client’s products and manufacturing processes.

Based on chemical nanotechnology, Nanogate combines classic organic and inorganic materials with the varied properties of nanomaterials. This enables the company to programme tailored combinations to suit specific customers’ needs and market requirements. Nanogate uses its chemistry expertise from procedures and processes – such as colloid chemistry or sol-gel chemistry – to build up nanostructured materials which are then used for customer products and processes.

To date, more than 200 solutions have been mass-produced. Nanogate focuses not only on creating higher-performance products and more cost-effective manufacturing processes – the company also enables scarce resources to be used more efficiently. Nanotechnology is considered a key means of improving environmental protection and minimising the consumption of resources.

To enable product requests to be implemented as quickly and efficiently as possible, Nanogate has transformed its expertise in chemistry and materials sciences into mature technology platforms.

Each of these technology platforms in turn incorporates a large number of complete systems which have already been proven in practice and utilised in the respective markets. These provide the ideal starting point for customers’ product refinement projects and can be combined with one another to create multifunctional systems.

- Surface energy
- Barrier properties
- Tribological properties
- Electrical functions
- Optical functions
- A wide range of additional functions (e.g. antibacterial)

Based on its technology platforms, Nanogate is constantly developing innovative applications. The company concentrates on three promising areas of expertise:



**Energy efficiency** comprises applications for efficient heat transmission in heating systems (realised in conjunction with Bosch) and solutions which improve the gliding properties of metallic substrates, for example. As part of these activities, processes such as NanoPlating® are used to create metallic composites with new properties. Electrochemical processes and the use of nanostructures enable friction, abrasion and dirt deposits on surfaces to be considerably reduced (tribology).

In the field of **air filtration**, a series of innovative filter systems are being developed on the basis of Nanogate technologies such as N\_charge®. In addition to being more powerful, these systems also have longer service lives or incorporate antibacterial protection. Fine dust filters are a concrete example of how this technology is used. A permanent electrostatic charge in the filter ensures that particles are bound more efficiently, but the filter's air permeability remains virtually unaffected, increasing the filter's efficiency. To achieve this, the filters are equipped with a high-capacity, transparent, quasi-permanent storage layer for electrostatic charges. N\_charge® enables electric charges to be stored on various bases – such as glass, textiles or plastics – cost-effectively and for an unlimited period of time. This was previously impossible.

The **light guiding** area of expertise is based on the ground-breaking, patented technology Dotfarm® Optics. With this technology, Nanogate offers nanostructured optical systems for the efficient use of light and improved light guiding. Dotfarm® Optics is based on generating highly precise grid structures on the surface of a flat optical waveguide. This typically involves millions of individual grids ("dots") being formed locally of which the properties can be individually adjusted. The technology can be used in consumer electronics, signal processing and LEDs. In addition to technical improvements, the main benefit offered by Nanogate's proprietary technology is the competitive advantage resulting from greater efficiency at lower costs.