

Media communiqué

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«Technology Briefing» at Empa

Nanomaterials in paints, varnishes and lacquers

Thanks to nanoparticles, modern surface finishing products such as paints and varnishes are easier to use, last longer and offer effective substitutes for problematic biocides. The time is ripe to exploit these advantages, without losing sight of the possible risks. At the recent Technology Briefing at Empa new ideas and information on the responsible, ecologically sustainable and safe use of nanomaterials were exchanged and discussed.

The paint, varnish and lacquer industry hopes to gain a great deal from nanotechnology. Nanoparticles added to paints, for example, render them corrosion resistant and scratch-proof, and can even make them self-cleaning, explained Joerg Guettinger of the Lake Constance Nano-Cluster. Last year some 4.2 billion US dollars were spent on nano research worldwide, mostly in the EU, USA and Japan. Dietmar Eichenstaedt of the Association of German Varnish and Printing Ink Manufacturers (VdL) used that country as an example to demonstrate the potential at hand. Forty per cent of the 230-odd German varnish and printing ink producers are already using nanotechnology today. This branch of industry manufactures two million tonnes of varnish, paint and printing ink annually, generating a turnover of 5.3 billion Euros. Eichenstaedt predicted that in five years some 15 per cent of the turnover would be derived from "...real nanotechnological applications in «Smart Coatings»."

Practical applications

One company which is already exploiting the advantages offered by nanotechnology is Buehler AG in Uzwil, Switzerland. Their Oxylink™ product is a water-based, multi-component metal-oxide nano-dispersion. According to the firm's representative, Detlef Burghard, Oxylink™ can significantly improve the service characteristics of water-based coatings in several ways including. It makes them more resistant to caking and offers better humidity tolerance, while at the same time accelerating the drying rate and increasing the dirt repelling properties of the coatings. In many cases these improvements means that water-based coatings offer the same level of performance as solvent-based paints and varnishes, allowing a changeover to the former products which are environmentally safer.

The Bacoat company is using «Akacid Plus», a polymer electrolyte additive it has developed for paints, varnishes and coatings which provides a certain amount of protection against the growth of microorganisms. Bacoat's Edgar Wittlin believes that this product has great potential because increasingly stringent hygiene requirements are raising the demands placed on industrial products and their surface coatings.

Finally the US manufacturer Dow Coating Materials presented two examples in which binding agents are structured specifically to improve the hardness, cracking resistance and printing properties of coatings.

Opportunities and risks

Nanomaterials are also having a positive impact on coatings for building façades. They slow down the rate of degradation due to UV exposure and are being studied as possible alternatives to problematic biocides. In addition nanoparticles allow the manufacture of innovative new products in the areas of thermal insulation and self-cleaning surfaces. These will, however, only be able to establish themselves on the market when they are proven to be safe in terms of human health and the environment.

Empa has therefore begun a project called «Nanohouse» with industrial partners. The aim is to investigate the opportunities and risks presented by nanotechnology-based façade coatings, covering the entire life cycle of these products. The project team will research into such questions as the possible release of nanoparticles from the coatings, and the behavior of such particles in the environment. In conclusion the project team intend to create a set of guidelines covering the correct means of handling nanomaterials in terms of safety, recycling and disposal.

Dietmar Eichenstaedt of the VdL also discussed safety and security aspects of nanomaterials. He reported on a recent study in which the release of nanoparticles from varnishes was investigated. Since the study uncovered no health risks, Eichenstaedt felt that a set of guidelines specifically covering the treatment of surfaces with paints and varnishes was unnecessary. On the other hand, a guideline for varnish production has already been written and submitted to the German federal government for consideration as part of the ongoing nanodialog, according to Eichenstaedt.

For further information and presentation documentation please see: www.empa.ch/farben



A model house on the Empa site in Dübendorf. It is fitted with façade elements treated with different plaster and paint surfaces. One surface coating contains silver nanoparticles.

The images in print-quality resolution and the text in electronic form are available from redaktion@empa.ch