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Brilliant decorative solid-state thin films for metallic coverings and facades

For the first time, the Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP will be presenting various large-area decorative solid-state thin films on metal surfaces during the V2015 (October 12–15, 2015, Dresden, Wyndham Garden Hotel, booth No. 5).

Metallic surfaces must be able to meet many requirements: they should, for instance, be scratch-resistant, water-repellent, matte or antibacterial. For the most part, surfaces should also be aesthetically appealing. Coatings must therefore take on numerous functionalities at once. The application of such decorative multifunctional layers onto smaller surfaces is currently already unproblematic, as thin solid-state layers can be applied in a vacuum.

When one now considers entire house facades, coverings, or wall panels made out of sheet metal, then it is no longer a simple matter to evenly and decoratively coat such large areas.

The Fraunhofer FEP has several solutions in place. For years, the scientists have been working on technologies for surface layer coating. For example, they have roll-to-roll equipment where they are able to vacuum coat metal strips with differing materials and colors. On a gold-colored surface, for example, titanium nitride layers are used, which not only look decorative, but also protect the surface from deterioration and corrosion.

In contrast to such colors, which are induced through light absorption within the material of nitride or carbide layers, so-called interference colors are based upon thin transparent oxide layers (for example, titanium oxide). They produce especially brilliant colors. The interference effect is known from oil in a puddle, where the oil will shimmer in the most varied colors under the light of the sun. Depending on the desired colors, scientists are able to precisely apply the appropriate oxide layer in a vacuum. They can thus depict a great variety of colors in varying nuances. The selected oxide layers are scratch resistant and, following an ultraviolet light irradiation, take on a photo catalysis state, which allows the surface to be cleaned easier.

Professor Metzner, division director of „Coating of sheets and metal strips“ at the Fraunhofer FEP, explains: “Because of our many years of experience in the development

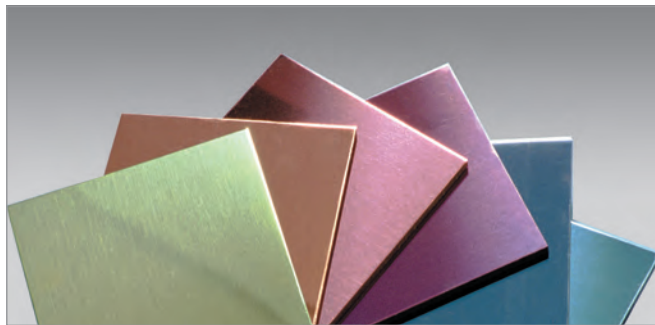
of processes, we are able to offer our clients and partners a broad spectrum of decorative layers and can optimize these for the specific intended usage.”

Not only flexible metal strips can be coated at Fraunhofer FEP. Of course, rigid sheets can also be coated. The scientists are supporting industrial partners across the entire scale of product development. Starting from feasibility studies to sampling of surfaces to process development under laboratory conditions, Fraunhofer FEP is able to adopt an initial pilot production in their large plants together with industrial customers. The surfaces coated at Fraunhofer FEP not only look good – they can be provided with additional functions as per the wish of the customer, such as coats against scratches or fingerprints.

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**Plates coated with interference colors**

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**Decorative coatings on flexible metal strips**

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The **Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP** works on innovative solutions in the fields of vacuum coating, surface treatment as well as organic semiconductors. The core competences electron beam technology, sputtering and plasma-activated deposition, high-rate PECVD as well as technologies for the organic electronics and IC/system design provide a basis for these activities. Thus, Fraunhofer FEP offers a wide range of possibilities for research, development and pilot production, especially for the processing, sterilization, structuring and refining of surfaces as well as OLED microdisplays, organic and inorganic sensors, optical filters and flexible OLED lighting. Our aim is to seize the innovation potential of the electron beam, plasma technology and organic electronics for new production processes and devices and to make it available for our customers. COMEDD (Center for Organics, Materials and Electronic Devices Dresden) with all known activities in organic electronics is now acting as a new business unit at Fraunhofer FEP, Dresden, Germany.