PRESS RELEASE – HANNOVER MESSE

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Improved corrosion protection with flake-type particles of metal-phosphate

Large quantities of steel are used in architecture, bridge construction and ship-building. Structures of this type are intended to be long-lasting. Furthermore, even in the course of many years, they should not lose any of their qualities regarding strength and safety. For this reason, the steel plates and girders used must have extensive and durable protection against corrosion. In particular, the steel is attacked by oxygen in the air, water vapor and salts. To prevent the corrosive substances from penetrating into the material, a common method is to create an anti-corrosion coating by applying paint layers of zinc-phosphate particles. Now, research scientists at INM developed a special type of flake-type-shaped metal-phosphate particles: They show improved passivation ability and improved diffusion barrier against corrosive substances. Besides zinc phosphate also newly developed manganese phosphate flakes are available.

The developers will be demonstrating their results and the possibilities they offer at stand B46 in hall 2 at this year's Hannover Messe which takes place from April 23 to 27.

The flake-type shaped particles, because of their anisotropy, show a better solubility compared to spherical particles with similar composition. “Now, more phosphate-ions are set free from the coating on demand and re-passivation of bare metal surface, for example as a consequence of a mechanical damage, is more effective,” the head of the program division *Nanomers*®, Carsten Becker-Willinger says.

“Furthermore the flake-type particles arrange in the coating in a roof-tile manner. This means that the pathway for the penetration of the corrosive gas molecules through the protective coating is prolonged because they have to find their way around the flakes,” the chemist Becker-Willinger explains. As a result the corrosion process was much slower than for coatings with spherical particles where the gas molecules can find their way through the protective coating to the metal much more quickly.

In series of tests, the scientists were able to validate the effectiveness of the new particles. To do so, they performed standardized accelerated corrosion tests on steel plates coated with epoxy resins containing metal phosphate particles. The tests revealed that coatings containing phosphate flakes behave about ten times better than coatings containing spherical phosphate particles.

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The flake-type shaped metal-phosphate particles are synthesized in a controlled precipitation process developed at INM.

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