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Press Release No. 7

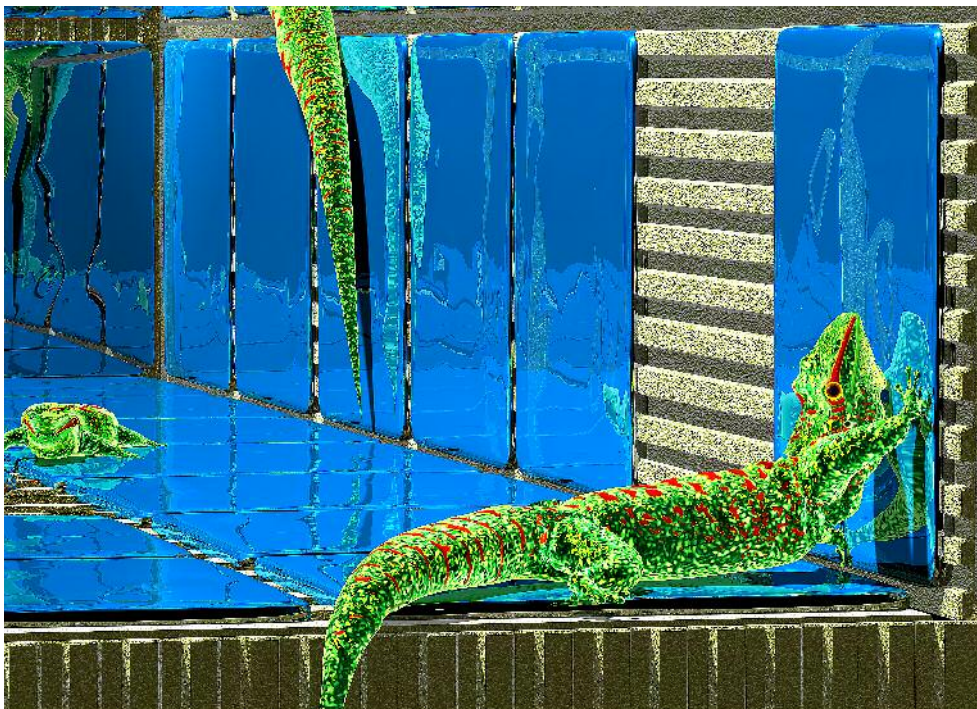
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PCI Nanolight – a universal bedding mortar

The Tiler and the Gecko



Lizards lead the way – Geckos can even run up vertical walls thanks to the nanoscale structures on their feet. Degussa uses similar dimensions a billionth of a meter in size for the first universal tile adhesive. By combining special fillers and binders the right nanostructures can be developed to enable a particularly powerful adhesion between tiles and the surface underneath.

Herbert Koch has at last made up his mind – he needs to get the professionals in to completely revamp his house. Several of the rooms are long overdue for a good re-tiling, so he's on the phone to a local builder. "I have a nice little "money earner" for you", he declares, generous to a fault.

The builder comes by as arranged – and immediately sees the actual scope of the work required in what was supposed to be a run-of-the-mill job. The floors and walls need re-tiling, but that certainly won't present much of a problem. However, where the headaches start is with all the different types of flooring. Glazed tiles on top of glazed tiles, flagstones and tiles laid on top of PVC, cement and plaster – Herbert's household can claim to have just about anything physically possible underfoot.

What the tiler needs to do in situations like these is to make sure he chooses the ideal bedding material for each particular type of flooring. And it's not just private households

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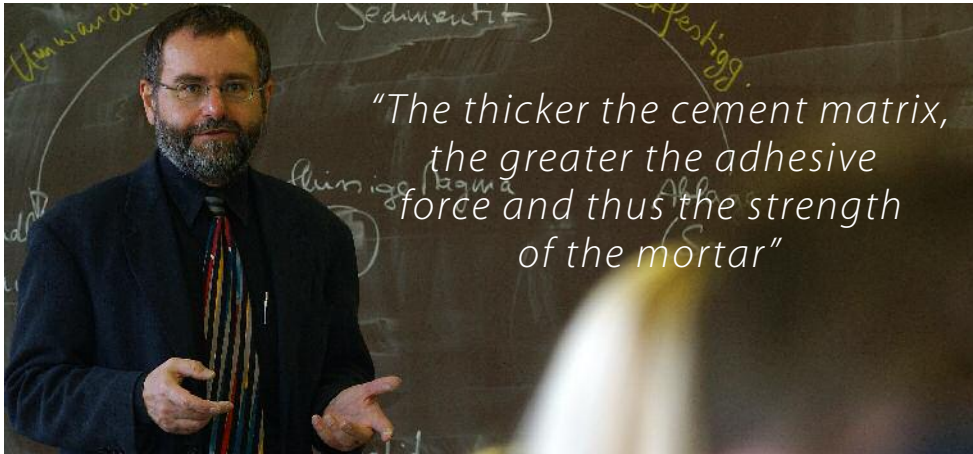
that have this problem. Large-scale projects face the same dilemma. Often the builder can only decide the right course of action after he visits the project site in person – after all, contract tenders specifying precisely which products are to be used are very few and far between. The most convenient and still economic solution is to use a universal tile adhesive that is equally suitable for all types of floors and ceramic surfaces. Until recently, however, there was no such product available.

A luxurious place to stay – An annex is being added to the Best Western- Hotel in Bremen with 21 apartments. Luxurious Villeroy & Boch "Bernina" porcelain stone-ware is being used for the bathrooms. Nanolight means the "wall jewelry", some of which is made of larger pieces, can grip the wall particularly securely.

The breakthrough – lightweight mortar technology and nanotechnology in symbiosis

While searching for a proper do-it-all substance, chemists working at PCI Augsburg GmbH, part of the Degussa Group, recently managed to pull off precisely such a feat.



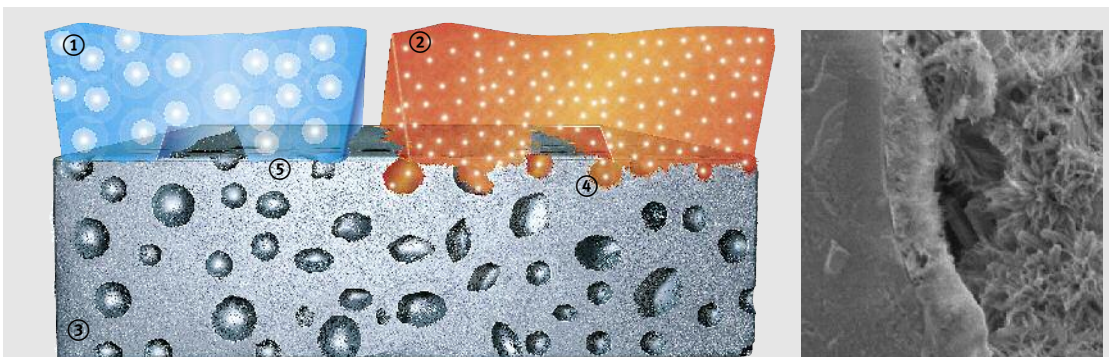


Construction materials specialist Professor Manfred Schnell carries out research and teaches at Augsburg Technical University. He has headed the laboratory for construction materials science there since 2000, and teaches architects and construction engineers. In addition, he often appears as a public witness in court giving his expert opinion on floor constructions, including tiles and pavements.

“What proved key to our success was our expertise in the field of nanotechnology”, explained Klaus Gunter Theobald, in charge of Central Marketing at PCI Augsburg. And PCI Nanolight is the result – the first universally applicable tiling adhesive.

Given the name, it’s quite surprising that PCI Nanolight actually contains no nanoparticles whatsoever. Rather, the innovation is based on a patent-pending combination of special fillers and binders. This formulation in turn enables the hardening process to be controlled in such a way as to develop the right nanostructures. “The finer these are, the better the adhesion”, emphasizes Professor Manfred Schnell, in charge of Construction Materials Science at Augsburg Technical University. Using nanotechnology means the cavities in the cement can also be filled.

“The thicker the cement matrix, the greater the adhesive force and thus the strength of the mortar”, Schnell points out. Photographs taken using a scanning electron microscope provided close-ups of the deepest levels of the microcosm. This revealed that structures of this nature are able to radically strengthen adhesive properties as a result of an ideal interlocking structure. “With standard concrete this kind of strong bond is simply not possible because the structure of the material is much too coarse”, Schnell explained.



Tile adhesives compared: Traditional products (1) have large structures, while the particle structure of the Degussa version (2) is much finer. The strong adhesion to the tile (3) is achieved through the interlocking nature of

the nanostructures in the pores (4). With previous solutions the material structure is far too large. Shown in the scanning tunnel microscope are the tile on the left and the fine structures of the adhesive on the right.



Swimming below a roof of palm trees – At the Wörishofen thermal baths (1) 12,500 square meters were tiled over with Degussa's adhesive mortar, including the bar area (2) and the children's slide (3). The demand for an adhesive that lasts is especially high in swimming pools.

Yield up by 30 percent

But PCI Nanolight has other key benefits to offer the construction industry. Unlike traditional adhesives, this innovative product has a particularly high-quality yet extremely light element added to it, namely a granulate made from tiny glass-balls, manufactured industrially from recycled glass powder and referred to as foamed glass. This granulate is classified as a construction material having the highest fire class A1, "non-flammable". In other words, in a fire it gives off neither toxic gases nor noxious fumes. And that means PCI Nanolight also complies with the requirements of the flexible mortar guideline issued by the Deutsche Bauchemie e.V. (Frankfurt a.M.), the umbrella association of over 100 German manufacturers of construction chemical products.

Thanks to a unique combination of light filling materials, tried-and-tested additives and binders, PCI Nanolight goes 30 percent further than traditional tile adhesives, greatly increasing the amount of tiles that can be laid per sack. That represents a substantial advantage for the manufacturer. Traditional adhesives have to be "shouldered" in 25-kilo sacks by the builder. With PCI Nanolight there's no need for this "show of strength" any more, as the sacks weigh only 15 kilos for the same volume, considerably lessening the impact on the body – an additional benefit for the customer. It means the material can be packed into paper carrying sacks with an integrated handle and still offer the same yield – something that was not possible with the original much heavier packages.

PCI Nanolight is also well suited for evening out and touching up work, as well as for smoothing uneven wall and floor surfaces prior to the tiles being laid. In these cases the thickness of the adhesive bed or coating can vary between 1 and 15 millimeters. This different thicknesses that can be used mean that tiles can be laid in both a thinner and a thicker layer of mortar (thin bed or medium bed process). Besides the fact that PCI Nanolight can be worked so well, it also provides excellent structural strength and stability. And what's more, the developers have managed to reconcile seemingly contradictory requirements such as "long working times" and "rapid setting". What this actually means for PCI Nanolight is that the adhesive can be worked for around 30 minutes, and the tiled

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Convinced by Degussa quality: Hans-Werner Wilde, property maintenance manager at KWB, the specialist tile company in Gilching.

area can be walked on and grouted after only about five hours. Extending the time the adhesive can be worked is hugely beneficial when laying tiles, because it means the position of a tile can be corrected after it has already been set into the adhesive layer.

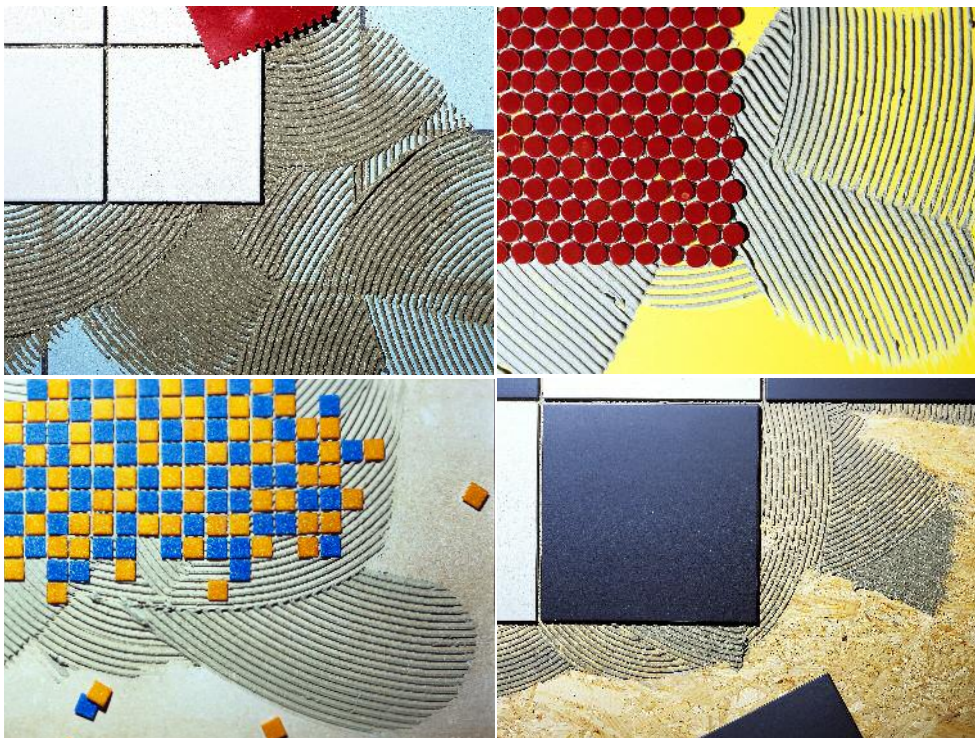
The advantages of nanotechnology are particularly impressive when it comes to vertical surfaces. The exceptionally good interlocking structure and the resulting adhesive properties mean that even heavier tiles can be set at first attempt, while still allowing for corrections. The gecko springs to mind here – a lizard able to effortlessly run up vertical walls thanks to nanoscale structures on its feet, while still retaining its amazing flexibility.

In high demand for swimming pools

Since its launch, PCI Nanolight has taken the sophisticated German market by storm. "In its first year it has already been used to tile a total surface area of five million square meters," notes Theobald, summing up progress to date. By the end of 2004 this figure is set to rise to seven million square meters. The number and scale of reference projects is already equally impressive, ranging from a 70 m² size mosaic artwork in the Nuremberg rail station to a 12,500 m² size surface area in the Wörishofen thermal baths. Expertise and quality are in particular demand in swimming pools because the requirements of the adhesive are especially high.

Because the introduction of the product into the various European countries was staggered, Germany still dominates at present, with a market share of 80 percent. But the focus is now on expansion into other European countries as well.

Can be used anywhere – The PCI bedding mortar is equally suitable for laying tile on top of tile (top left) or on plaster (top right), concrete (bottom left) or chipboard/particle board (bottom right).





The station as a backdrop – The large-scale mosaic artwork by Iris E. Rauh in the Nuremberg main station portrays a journey through two centuries of railroad history (left). The artist has glued together fragments of tile, marble, glass, mirrored glass and –typical for a railroad – gravel (right).

Degussa's customer base already extends from England and Italy, via the Czech Republic, Poland and Hungary and on into Russia. In these countries PCI Nanolight has so far met with a very positive reaction and acceptance among all the domestic and foreign manufacturers. As is the case, for example, with Hans-Werner Wilde, property maintenance manager at KWB, the specialist tile company in Gilching near Munich.

“With PCI Nanolight I have a single adhesive at hand that I know I can feel confident about using everywhere,” Hans-Werner notes with satisfaction. This also applies to the construction of the Munich-based Allianz Arena stadium, in which KWB is involved. Hans-Werner puts it in a nutshell: “The contract covers all the main and satellite kitchens, as well as 32 sales kiosks for the new stadium. We’ll be using only the absolute best for these areas.”

The Construction Chemicals Division of Degussa is the global market and technology leader in the field of construction chemicals products. The aim of its research, development and production activities is to make construction work not only safer but also more economic, efficient and environmentally compatible by means of intelligent solution systems. Degussa Construction Chemicals is divided into two major product-oriented segments – Admixture Systems und Construction Systems, which are organized regionally. Some 7,200 people worldwide work for the Division, which in fiscal 2003 generated sales of approx. 1.72 billion euros and earnings before interest and taxes (EBIT) of 184 million euros.

Degussa is a multinational corporation consistently aligned to highly profitable specialty chemistry. In fiscal 2003, its 47,000 employees generated sales of 11.4 billion euros and operating profits (EBIT) of 878 million euros, making it Germany's third-largest chemical company and the global market leader in specialty chemicals. Innovative products and system solutions enable Degussa to play a valuable and indispensable role in the success of its customers, as summed up by our claim “creating essentials”.