

Joining material experts from around the world to share their knowledge on material innovation. This blog is part of the exhibition 'Hello Materials' at the Danish Design Centre.

Hello Nanomaterials – Towards Cultural (R)Evolution

POSTED ON MAY 29, 2012 BY SYLVIA LEYDECKER | [LEAVE A COMMENT](#)



Nanotechnology and nanomaterials already affect all branches from aerospace to automotive over IT and medicine, to architecture and design – but by now, it's just the very beginning of what's coming up far beyond the horizon. Nanomaterials will change our world and approach to materials completely.

Just to give a brief introduction: it's not really about the material itself, its about the size of the material which comes down to the size of a few **nanometres**. Below 100 nm the property of a material changes dramatically, for instance it could happen to change its colour or even its electrical conductivity.



Furthermore nanoparticles are highly reactive because of their enormous surface compared to their volume. This is why they are mentioned in context of “risk”, whereas at the same time nanoparticles are usually tightly bound in the surfaces/materials and tend to agglomerate as **free particles**. It’s a risk not to take the chance, so risk and usefulness have to be considered carefully.

“Risk and usefulness have to be considered carefully”

Most important chance: If there’s a reason to use nanotechnology e.g. nanomaterials, it’s always because of the vision of a better world. This doesn’t mean a perfect world, but as mentioned before in this blog, “**there are no environmentally friendly materials ...**” – it’s about limiting the damages and here’s definitely the chance. It has the potential to save precious but fleeting resources by improving energy-efficiency, for instance by reducing production-steps, lowering production-temperatures, substitute harmful materials, enabling light and simultaneously strong constructions, reducing maintenance-costs, finally also saving money and last but not least being more comfortable.



There’s quite a lot real-world examples already here, since years in use on the market, but still regarded as “innovation” – such as easy-to-clean surfaces, (almost) self cleaning photocatalytic surfaces, **Lotus-effect**.

They are the ones to help reducing cleaning maintenance of glass, ceramic, and so on. In terms of energy use, regarding heating and cooling, there are slim insulation panels containing **aerogel**, **phase-change-materials** to buffer temperatures, which increasingly are found implemented in textile, plasterboard etc. Office working spaces benefit from **electrochromic** and **thermochromic** glazings. Nano-improved surfaces optimize wave-admission and therefore the efficiency of **photovoltaic** modules, whereas nanotubes will improve wind turbines. Strong and ultralight composites are found in sports equipment, air-cleaning concrete helps improving air-quality, indoor and outdoor. My Birkhauser-book “**Nanomaterials in Architecture, interior Architecture and Design**” gives a profound understanding into that topic.



StoLotusan Color Paint.

Self-cleaning, innovative exterior paint with the Lotus-Effect®. Water is unable to get a grip on the surface, and dirt simply washes off in the rain, keeping the facade clean and dry for longer.



It should be

considered, that some products are not ready for the mass market, such as VIP s (**Vacuum Insulation Panels**), as they are quite complicated to implement.

The same with easily damageable OLED's (**Organic Light Emitting Diodes**), dreaming about light glowing foil-walls and ceilings, they up to now just made it to a small size, wrapped in glass for protection.

Nevertheless it's a question of time and they will be ready for the big bang and the masses, so stay tuned...

Furthermore it seems to be a question of cultural mentality, where on the globe dreams come true first. But: on one hand, for benefit, it needs to be implemented in the markets, on the other hand it has to be considered carefully where to use what and why. For instance, better refuse antibacterial functions in everyday use, because it provokes resistances, which are a huge unsolved problem in healthcare. Hospitals around the world fight against multi-resistant bacteria (MRSA), which is liable for multiple deaths in hospitals every year. So, antibacterial functions, from that point of view, should be in use exclusively for healthcare.

"it seems to be a question of cultural mentality, where on the globe dreams come true first"

In the future, mass production is needed as well as sustainable design. Designing in a functional and aesthetic way, always implements finding the form which suits materials and production techniques.

Social, economical, ecological and always contemporary solutions are needed, therefore newly formulated aesthetic criteria is crucial. Holistic approach, doesn't mean it comes down to the single material – you wouldn't qualify a building nor a human being by it's single parts either. It doesn't matter if it's a chair or an airplane, it's always the whole thing which is important for us.

"holistic approach, doesn't mean it comes down to the single material"

Nature is a complex machinery with it's own still widely unknown regulations, which scientist still try to find out. Getting inspired by nature, what **bionic/biomimicry** is known for, is also realised with the help of nanotechnology. Therefore the popular Lotus Effect is a good example. By the way:

Recently it's **hydrophobic properties** have been topped by a textile being under water but dry for

around four days – inspired by insects. Of course, from a popular point of view, "bionic" saves the world whereas "nano" tends to be risky ...finally, all we know and try to do is just the tip of the iceberg.



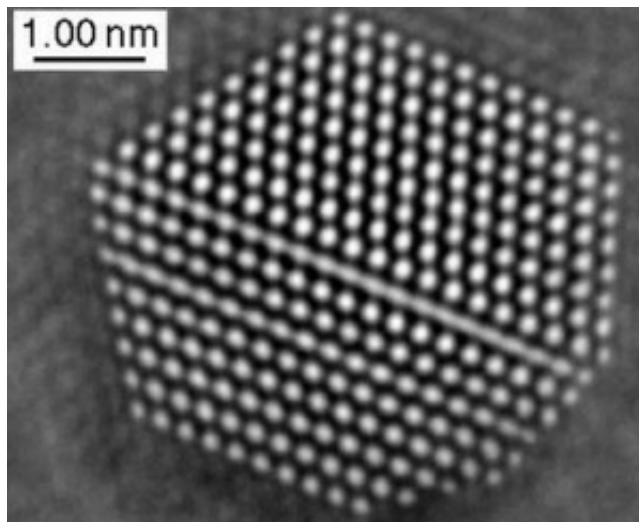
Nature inspired carbon-construction.

As early as Greek philosopher Leukipp mentioned atoms, in 1959 Richard Feynman has been talking about manipulation at the atomic level, 1989 the image of the letters IBM, written by individual atoms went around the world, football associating "**Bucky balls**", C-60-Fullerenes are the icons of nanotechnology and have been awarded Molecule of the year by Science Magazine in 1991.

"it will change our world and our approach to "materials" itself, which then is seen from another perspective – the atomic scale"

Today nanotubes are most interesting for superstrong and ultralight constructions and most recently graphene-layers “**Buckypaper**” are on the forefront for a wide variety of applications from IT to building industry – again pointing out into the future. The development to benefit of the potential of nanomaterial, related to the atomic scale, is still at the beginning.

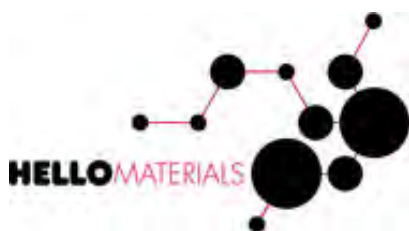
The potential seems to be huge, furthermore it seems to be an upcoming cultural (r)evolution, because seen from a meta-level, far beyond the horizon it will change our world and our approach to “materials” itself, which then is seen from another perspective – the atomic scale.



About Sylvia Leydecker

Sylvia is an interior architect and Director of the Cologne based studio 100% interior. Sylvia is regarded as an expert on nano materials.

[> More about Sylvia Leydecker](#)



About the Hello Materials exhibition

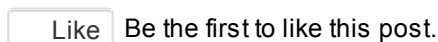
Experience fascinating examples of present and future materials and gain an insight into what they will mean to society and the individual. Visit the exhibition between the 2nd of April and the 21st of September 2012.

[> Visit ddc.dk for more information about the Hello Materials exhibition](#)

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