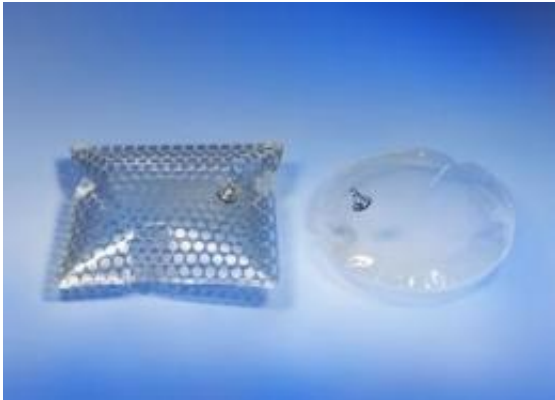


Films for facades

December 16 2010



With a new gluing technique membrane cushions can be made in any geometry.
Credit: Fraunhofer IFAM

Films instead of walls. This is an idea that fascinates architects all over the world. The Eden Project in Southern England, the National Aquatics Center built for swimming events at the Olympics in Beijing and the Allianz Arena in Munich are only three examples of what you can make from plastic sheets. Ethylene tetrafluorethylene (ETFE), a transparent membrane, is especially popular because it enables buildings that shine in all colors as in Munich and Peking.

But, we are not just talking about colors. You can use this new foil for an intelligent improvement of existing buildings – by regulating heat, coolness and light precisely according to needs. Experts see film construction as a market poised for the future.

Whether this market develops and if so how quickly is not a question of taste but of the technical possibilities – the financial options. [Films](#) will have to be low-cost, easy to process and free of health hazards for them to have a chance in the international construction business. This is the target that six Fraunhofer institutes are working jointly toward in the Multifunctional Membrane Cushion Construction project.

Engineers have been able to use coatings to change the properties of ETFE foils specifically. For example, membrane cushions with an inner coating of tungsten trioxide turn blue when they come into contact with hydrogen and lose their color if the cushions are filled with oxygen. Thus the passage of light can easily be regulated. Project coordinator Andreas Kaufmann of the Fraunhofer Institute for Building Physics (IBP) states "you could use a foil such as this to cover the entire façade of a house and have light pass depending upon sunlight conditions."

The researchers were also able to solve another problem. To date, ETFE membranes have hardly been able to create a heat barrier, but a coat of paper-thin (and therefore transparent) layers of aluminum and paint make sure that heat radiation is effectively reflected. Kaufmann explains that "the challenge was overcoming the anti-adhesive properties of the membrane. ETFE is related to the anti-stick substance Teflon and hardly reacts with other substances chemically. This is why the surface of the foil first has to be pretreated chemically before coating." In the meantime, the researchers have not only come up with heat-insulating, but also antibacterial layers that inhibit the growth of mold and yeasts that form ugly black coverings.

As Robert Hodann, the CEO at film manufacturer Nowofol and industrial partner of the research project, puts it, "we believe that ETFE will emerge as a strong market of its own. The captivating thing about ETFE foil is its transparency combined with its great strength – no other plastic membrane can compete." For instance, it will be possible to make

LED façades with ETFE foil behind which thousands of light-emitting diodes can be installed. This would be an easy way to transform facades into gigantic illuminated screens.

Provided by Fraunhofer-Gesellschaft

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