

Feel-good glass for windows

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Daylight acts on our body clock and stimulates the brain. German researchers have made use of this knowledge and worked with industry partners to develop a coating for panes of glass that lets through more light. Above all, it promotes the passage through the glass of those wavelengths of light that govern our hormonal balance.

Most people prefer to live in homes that are airy and flooded with light. Nobody likes to spend much time in a dark and dingy room. That's no surprise, since daylight gives us energy and has a major impact on our sense of wellbeing. It is a real mood lifter. But not everyone is lucky enough to live in a generously glazed home, and office spaces – where we spend many hours of each day – are often not exactly bright and breezy. Modern heat-insulating, sun-protection glazing for offices and housing doesn't make things any better, since it isn't optimized to allow the light that governs our hormonal balance to pass through: instead, a distinctly noticeable percentage of incident sunlight in this effective part of the spectrum is reflected away.

Anti-reflective [glass](#) that is more transmissive overall to daylight is reserved for certain special applications, such as in glass covers for photovoltaic modules or in glazing for shop windows. The aim with this kind of glass is to avoid nuisance reflections and to achieve maximum light transmission at the peak emission wavelength of sunlight. This is the wavelength at which the human retina is also most sensitive to light. “However, our biorhythms are not affected by the wavelengths that brighten a room the most, but rather by blue light,” explains graduate engineer Walther Glaubitt, a researcher at the Fraunhofer Institute for

Silicate Research ISC in Würzburg. That is why he and his team have developed glass that is designed to be particularly transmissive to light in the blue part of the spectrum. The secret is a special, long-lasting and barely perceptible inorganic coating that is only 0.1 micrometers thick. “Nobody’s ever made glass like this before. It makes you feel as if the window is permanently open,” says Glaubitt. One reason the glass gives this impression is that it exhibits maximum transmission at wavelengths between 450 and 500 nanometers – which is exactly where the effects of blue light are at their strongest.

Lack of light gives rise to sleep disorders

Why is it that the blue part of the light spectrum has such an impact on our sense of wellbeing? “There is a nerve connecting the human retina to the hypothalamus, which is the control center for the autonomic nervous system,” explains Glaubitt’s team colleague Dr. Jörn Probst. Special receptors sit at the end of the nerve connection which are sensitive to blue light, converting it into light-and-dark signals and sending these to the area of the brain that functions as our biological clock. There, one of the things these nerve impulses do is regulate melatonin levels. A lack of light leads to high levels of melatonin, which can result in problems sleeping and concentrating, as well as depression and other psychological impairments. Seasonal affective disorder, also known as winter depression, is one possible outcome of unusually high melatonin levels. “The coating we’ve developed helps people to feel they can perform better and makes it less likely they will fall ill,” says Probst.

Industrial partner Centrosolar Glas GmbH & Co. KG is responsible for applying the coating to the glass while UNIGLAS GmbH & Co. KG, the company that brought the product to market maturity, handles the remaining finishing work as well as sales. It is about to launch a triple-glazing product featuring this innovative glass, for which a patent is pending, under the name UNIGLAS | VITAL® feel-good glass. Fitting

triple glazing to a room does not make it seem appreciably darker, but it does affect the light that enters the room in a way that is detrimental to our biorhythms. This is especially true for people who have little opportunity to spend time outdoors and are obliged to spend most of their time in rooms with only small windows. “Thanks to the special ISC coating, this is not the case with our UNIGLAS | VITAL® feel-good glass. Instead, the light quality achieved is very close to that of single glazing,” says Thomas Fiedler, the Technical Director of UNIGLAS. Its transmissivity to light is increased across the entire range from 380 to 580 nanometers, which is to say in the portion of the spectrum that is responsible for promoting wellbeing. At 460 nanometers, the light transmissivity of UNIGLAS | VITAL® is 79 percent. Comparable triple glazing only lets through 66 percent of light at this wavelength. Meanwhile, the coating has no impact on the window’s heat-insulating properties.

But the ISC researchers haven’t quite reached their ultimate goal: “Up to now we’ve only applied our special coating to the side of the glass facing into the cavity between panes,” says Glaubitt. “In future we will also be coating the glazing’s exposed surfaces – in other words, the outside and the inside of the window. That will allow us to achieve around 95 percent [light](#) transmissivity at 460 nanometers.”

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