

Report from the 6th Photocatalysis Colloquium on 4 March 2021 as a web conference

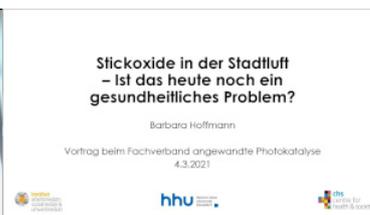
More and more cities manage to slip below the nitrogen oxide limit value of $40 \mu\text{g}/\text{m}^3$ at the measuring stations with their diverse measures. At the 6th Photocatalysis Colloquium entitled "Air pollution control and photocatalysis – the current status", seven experts from the Federal Environment Agency, research and industry outlined what further developments can be expected and what contribution photocatalytic materials can make.



Ute Dauert from the Federal Environment Agency showed that nitrogen dioxide pollution in Germany has continued to decrease over a large area, also at measuring points close to traffic. It is expected that fewer than 10 cities will continue to exceed the nitrogen

oxide limits after the evaluation is completed. In the cities, diesel cars generally made up the largest share of traffic-related nitrogen dioxide emissions. According to an evaluation by the Federal Environment Agency, on average about half of the decrease can be attributed to fleet renewal. Local measures in the cities, such as photocatalytic materials, play a smaller role overall, but can tip the scales locally to comply with the limit value.

Prof. Dr. med. Barbara Hoffmann, leading environmental epidemiologist at the Heinrich Heine University in Düsseldorf, presents various studies that have investigated short- and long-term health effects of nitrogen oxide exposure. There is clear evidence that chronic exposure to nitrogen oxides has effects on mortality and the respiratory system. Based on the data, no threshold for nitrogen oxide exposure can be derived below which no health effects are observed at all. In the interest of health protection, a further lowering of the limit values is necessary.



Both speakers reported that the WHO is revising its recommendation on air quality (Air Quality Guidelines) this year and that a lowering of the nitrogen oxide limits can be expected in the future.



Sebastian Czaja from TPA GmbH presents a road surface with a photocatalytic chip material. In addition to a reduction of nitrogen oxides, this also leads to a reduction of road noise. In order to integrate the chip material

homogeneously and permanently into the asphalt surface, the scatterer was integrated into the asphalt paver as a technical innovation. The company has implemented 11 measures nationwide and accompanied them scientifically as test sections. The NOx reduction potential was determined individually via modelling.

Dr. Thomas Koch, head of pigment analysis at the titanium dioxide manufacturer Kronos Int. Inc. reports on the PureBau research project, which dealt with the improvement of photocatalytic materials. It was possible to develop materials that show stronger deposition rates and thus also significantly increased reduction rates of nitrogen dioxide and ozone. Based on modelling, he shows how different surfaces (street, pavement, house facade, roof) affect the reduction rates. In summary, a significantly greater effect is observed the more surfaces are equipped and the more homogeneously the surfaces are distributed. The reduction can even affect neighbouring areas that do not have photocatalytic equipment.



Dr. Giuliana Beck from the German association of producers of pigments and fillers etc. (Verband der Mineralfarbenindustrie e. V.) explains how the CLP classification of titanium dioxide powders as a suspected carcinogen applies to

photocatalytic materials. The classification only applies to powders with a certain amount of respirable particles. It also deviates from a standard entry with additional footnotes. A hazard arises from the particles if respirable dust is inhaled in such a large quantity that lung clearance is impaired. This danger is also already countered by occupational dust limits. Possible dust caused by wear and weathering does not pose a risk. In waste legislation, too, a clarification is currently being drafted that only waste that corresponds to the entry as powder is possibly seen as hazardous waste.

Dr. Sven Hartmann from Industry Association Agrar e.V. (IVA) explained how nitrogen compounds, one of the most important nutrients for plants, are used in agriculture. There are undesirable losses in the nitrogen cycle in the order of 1.4 million tonnes of nitrogen in Germany, which corresponds to about 90 kg/ha. The



input from agriculture is clearly dominant compared to other sources. The agricultural industry is trying to further reduce losses with innovative solutions.



Kim Zieseniß, research associate at the Institute of Sanitary Engineering and Waste Management at Leibniz Universität Hannover, shows how nitrate is removed in the environment and in wastewater treatment. If the rainwater that

washes nitrate off photocatalytic surfaces is captured in centralised rainwater management, the additional nitrate input is negligible. In the case of decentralised management with infiltration into the soil, it is now the subject of research whether the input is naturally degraded or whether there is a shift into the groundwater. If necessary, the nitrate could even prove useful as fertiliser for urban trees, for example.

60 participants followed the digital event on the screen and asked questions to the speakers, which were answered after each presentation.

40 $\mu\text{g}/\text{m}^3$ reached and all is well? The Photocatalysis Colloquium 2021 showed that most cities now comply with the nitrogen oxide limits. However, one cannot rest on these results: From health protection's point of view, and in future probably also of the legislator, the limit value must be lowered further. It's a good thing that the development of photocatalytic materials is also being pushed forward and that the understanding of how these are best used is increasing.

We are pleased about a successful event and would like to thank our guests for their interest.

Yours sincerely, FAP