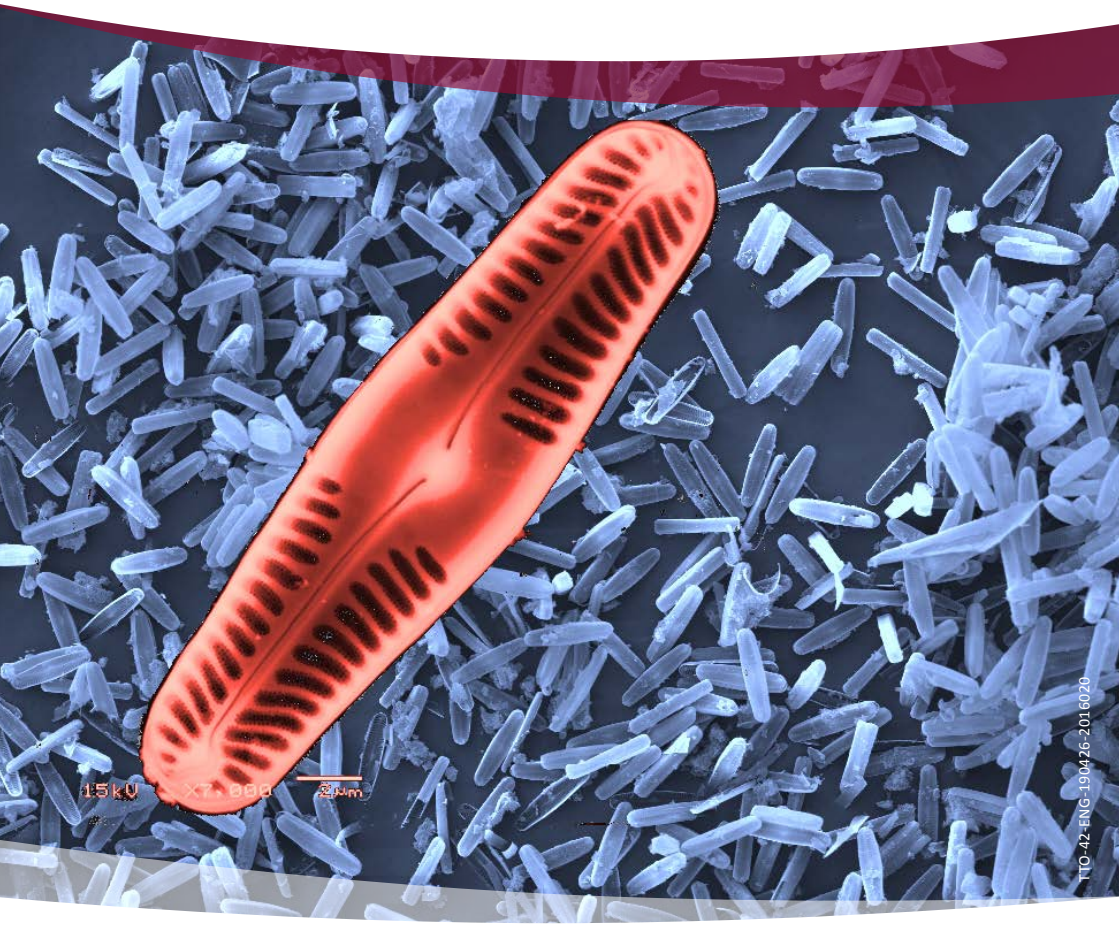
Technology Offer: Sustainable and efficient biotemplate silica-titania photocatalytic composites out of diatom frustules

The University of Antwerp developed a novel photocatalytic composite displaying photocatalytic nanoparticles at the inner surface of bio-based diatom frustules. The material significantly reduces VOC and NOx concentrations in polluted air, especially in interior applications.



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Relevance

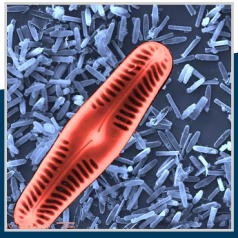
Air, including the indoor atmosphere, can be heavily polluted with various volatile organic compounds as well as NOx and other compounds that have a proven adverse impact on human health. Several conventional remediation strategies exist, including adsorption, thermal and/or catalytic degradation. All suffer from several drawbacks such as simple replacement of the pollutant from the air to the solid face, poor efficiency, high cost, etc. At the moment photocatalytic removal is among the most promising technologies because the polluting molecules are effectively destroyed. The catalyst immobilization, activity, stability, performance and reliability of TiO2 based materials has been extensively studied and demonstrated. On top of this, a more sustainable production method out of diatom algae has been developed.

About the technology

Diatoms, under controlled culturing conditions, incorporate significant amounts of titania in their biosilica frustules. The frustules consist of hydrated silica and offer a wide range of porosities combined with a high surface area. Due to the metabolic mode of incorporation of the TiO2 a biogenic, well-imobilised silica-titania material with superior photocatalytic properties is obtained. By incorporating the frustules in a foam-like structure, industrial problems like inadequate immobilization on reactor surfaces are avoided. We offer a sustainable, bio-based photocatalytic technology with applications in water and air purificiation. We are seeking industrial partners interested in developing air or water purification systems and are willing to invest in sustainably produced catalytic materials.

About the researchers

The DUEL group, founded by prof. Silvia Lenaerts in 2009, is located at the bioscience engineering department of the University of Antwerp and focusses on sustainable energy, air and water technology in providing complete solutions to environmental problems. Solar energy utilization and air purification are two of the most dynamic central research themes. Over the last five years the team has also built up extensive knowledge on gas sensing (prof. Tom Tytgat), photo-electrochemical air purification and plasmonics (prof. Sammy Verbruggen) and computational modeling of photocatalytic processes (prof. Siegfried Denys).



More information

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