

Air-purifying church windows early nanotechnology

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Associate Professor Zhu Huai Yong, from Queensland University of Technology's School of Physical and Chemical Sciences, said that church windows stained with gold paint purify the air when they are lit up by sunlight. Credit: QUT: Erika Fish

Stained glass windows that are painted with gold purify the air when they are lit up by sunlight, a team of Queensland University of Technology experts have discovered.

Associate Professor Zhu Huai Yong, from QUT's School of Physical and Chemical Sciences said that glaziers in medieval forges were the first nanotechnologists who produced colours with gold nanoparticles of different sizes.

Professor Zhu said numerous church windows across Europe were decorated with glass coloured in gold nanoparticles.

"For centuries people appreciated only the beautiful works of art, and long life of the colours, but little did they realise that these works of art are also, in modern language, photocatalytic air purifier with nanostructured gold catalyst," Professor Zhu said.

He said tiny particles of gold, energised by the sun, were able to destroy air-borne pollutants like volatile organic chemical (VOCs), which may often come from new furniture, carpets and paint in good condition.

"These VOCs create that 'new' smell as they are slowly released from walls and furniture, but they, along with methanol and carbon monoxide, are not good for your health, even in small amounts," he said.

"Gold, when in very small particles, becomes very active under sunlight.

"The electromagnetic field of the sunlight can couple with the oscillations of the electrons in the gold particles and creates a resonance.

"The magnetic field on the surface of the gold nanoparticles can be enhanced by up to hundred times, which breaks apart the pollutant molecules in the air."

Professor Zhu said the by-product was carbon dioxide, which was comparatively safe, particularly in the small amounts that would be created through this process.

He said the use of gold nanoparticles to drive chemical reactions opened up exciting possibilities for scientific research.

"This technology is solar-powered, and is very energy efficient, because only the particles of gold heat up," he said.

"In conventional chemical reactions, you heat up everything, which is a waste of energy.

"Once this technology can be applied to produce specialty chemicals at ambient temperature, it heralds significant changes in the economy and environmental impact of the chemical production."

Source: Queensland University of Technology

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