Australian Nanotechnology Alliance
Enabling Tomorrow

QUT

Solutions for Industry & the Environment
Case Study:
Nano-Structured Titania for Water Purification

Nano-structured titanium dioxide illuminated with ultraviolet light, works like a semi-conductor. The energised mineral breaks down organic chemicals and hormones, and destroys bacteria and viruses.

Key Advantages

- Removes organic matter from water or air i.e. phenolics, pesticides, oil, bacteria, viruses, moulds, odours, dyes, etc.
- Large, highly-reactive surface area
- Applied as either a coating, powder or sub-micron filter
- Added chemicals required
- Harmless by-products – CO^2 and water
- Inexpensive
- Self-cleaning
- Long-life span
- Non-toxic material
- Short time-to-market

Intellectual Property
The technology is protected by an Australian Provisional Patent, Application No. 2005906470

http://nanotechnology.org.au

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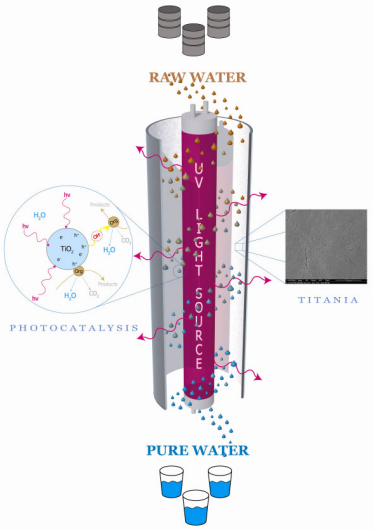
Researchers at QUT have developed a novel form of titania and a process for fabrication of an environmentally-friendly product that purifies water.

The innovative photocatalyst has a higher efficiency than current state of the art materials and is an ideal platform technology to complement existing product portfolios. A partnership opportunity exists to develop the technology in line with your organisational or industry requirements.



Market
The total world market for nanoparticulate materials is valued at almost $1 billion. This figure is forecast to reach $11 billion by 2011. Energy, catalytic and structural applications accounts for 12.7% and includes photocatalysts. The water purification market is valued at $20 billion per annum.

Technology
Titanium dioxide (TiO^2) is a semiconductor that is chemically activated by ultraviolet (UV) light.

Photocatalytic activity of TiO^2 is known and has been exploited in various applications including sterilization, sanitation and water remediation. Under the influence of UV light, TiO^2 generates hydroxyl radicals – highly reactive free radicals and strong oxidants – that degrade harmful contaminants into CO^2 and water.

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During the photocatalytic detoxification process, a large area of reactive surface is required for the treatment of large volumes of water. To date, applications of titanium photocatalysts have utilized either thin coatings of colloidal titanium or titanium nanotubes. These technologies suffer from an inability to be filtered from solution, or low surface area if applied as a film.

The material has an extremely high surface area, found to be between 88 – 120 $m^2.g^{-1}$, an increase of 1.8 – 2.4 times the surface area of current state of the art.

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