

International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

Balapur P.O., Hyderabad – 500005, Telangana, India



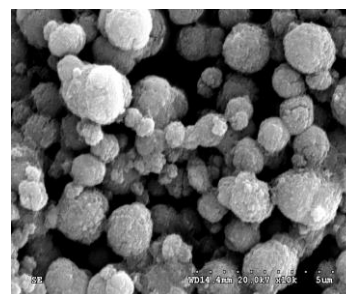
Multifunctional Titania Microspheres for Self Cleaning Applications

Overview

A novel titanium dioxide based material has been developed at ARCI for self cleaning application. The titania particles are micrometer in size but possess all the special properties due to nanostructure. This drastically minimizes any risk related to nanotoxicology and still provides all the benefits of nano size which makes it safe for processing, handling and use. Micron sized titania spheres are prepared by self assembly of rutile phased titania nano rods as a major part and decorated with particles of anatase phased titania and silver or silver chloride on its surface. This structure and morphology gives rise to multifunctionality such as self cleaning, antimicrobial, UV protection and brightener. This product has been proved for its high efficiency in "Self Cleaning" property. This technology was transferred to one Indian Industry and successfully commercialized for textile applications. The same material can be extended to many other applications.

Key Features

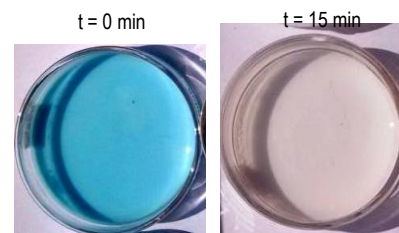
- Titania microspheres suspension in water at neutral pH
- Efficient photocatalyst
- Anti-bacterial
- UV absorber
- Visible light reflector
- Simple and scalable chemical synthesis
- Novel process for which patent is applied



SEM Image of Titania Microspheres

Potential Applications

- Self cleaning textiles
- Air purification
- Water purification
- Organic effluent treatment
- Additive to exterior building paint for self cleaning walls



Methylene blue dye degradation by photocatalytic activity

- 2 wt% TiO₂ suspension
- 0.48% Methylene Blue
- Exposed to morning sunlight

Technology Readiness Level

10

- Self cleaning and other properties validated at lab scale
- Scale-up upto 200 g per batch production established at lab scale
- Successfully commercialized for textile application

IPDI*	1	2	3	4	5	6	7	8	9	10
Activities	Basic concepts and understanding of underlying scientific principles	Short listing possible applications	Research to prove technical feasibility for targeted application	Coupon level testing in stimulated conditions	Check repeatability/consistency at coupon level	Prototype testing in real-life conditions	Check repeatability/consistency at prototype level	Reassessing feasibility (IP, competition technology, commercial)	Initiate technology transfer	Support in stabilizing production
Status										

Major Publications

1. Indian Patent No. **282988** : Improved method of producing highly stable aqueous nano titania suspension, Neha Yeshwanta Hebalkar and Tata Narasinga Rao
2. Patent pending : Improved process for the preparation of bi-functional silica particles useful for antibacterial and self cleaning surfaces , Neha Hebalkar, Tata Narasinga Rao, Application No. 3071/DEL/2010
3. Indian Patent No. **291408** : Method of producing multifunctional, self assembled, mixed phase titania spheres, Neha Hebalkar, Tata N. Rao

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