Nanocrystalline Colored (Defect) Titania: Preparation, Characterization and Photocatalytic Studies

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Date: 3.12.2019 **Venue: CB-310** **Time: 3.00 p.m.**

Titania (TiO_2) is one of the versatile and widely employed photocatalytic materials for a variety of industrial processes including water purification owing to its abundant availability, excellent chemical stability, non-toxicity, low-cost and environmental friendly nature. However, several technical concerns, viz., low surface area, large band gap, and rapid charge recombination, limit its practical application. On the other hand, the catalytic activity of titania is strongly dependent on its crystal structure, crystal defects and textural properties.[1,2] To circumvent this, there is a growing interest to tailor-make the titania matrix so as to modify its physico-chemical characteristics.[3,4] Indeed, the properties including light absorption, charge transport and surface adsorption, are closely related to its crystal defect, which in turn plays a significant role in the photocatalytic performance. Therefore, in recent years, attention has been focused on the synthesis, characterization and applications of colored (defect) titania and, currently, become one of the major research interests of the scientific community.[3-6] In this presentation, the design concepts, material characteristics, structure-property relationships and photocatalytic applications of colored titania, prepared using a variety of methods, will be discussed.

References

1) R. Asahi, T. Morikawa, H. Irie and T. Ohwaki, *Chem. Rev.*, 2014, **114**, 9824-9852.
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4) N. Serpone, *J. Phys. Chem. B*, 2006, **110**, 24287-24293.
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27.11.2019.
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PhD. Seminar – I (Research Proposal Seminar)

Metal-rubber interface in radial tyres: Fundamental studies

Name: M. P. Kannan (CY16D088)
Date : 02. 12. 2019

Venue: CB 310
Time : 3:00 – 4:00 pm

Abstract

Radial tyres are the preferred tyres by automobile manufacturers and riders because of their long service life, increased vehicle fuel efficiency and comfortable ride. Brass-coated steel cords are used in radial tyres as the main reinforcing materials.[1] Brass coating is considered as the bonding agent which facilitates the formation of an interface. Brass reacts with the sulfur containing species in the cis-polyisoprene rubber matrix to form a complex interface consisting mainly of copper sulphides ($CuS/Cu_{2-x}S$) interface. This interface helps in mechanical interlocking of the rubber resulting in a good adhesion. Rubber penetrates into the $CuS/Cu_{2-x}S$ nanostructures, giving a very firm interlocking rubber network adhered tightly with the interface.[2] For better performance of tyres, factors such as thickness, morphology and crystallinity of the $CuS/Cu_{2-x}S$ need to be tuned to increase the adhesion strength between brass and rubber.[3] This seminar gives an overview of prominent advances in imaging the interface in addition to the varied spectroscopic techniques used for understanding brass-rubber interface. The study also gives a summary of the computational studies to comprehend the interaction energies between copper sulphides and cis-polyisoprene.

References

1. Patil, P. Y. *et al., Rubber Chem Technol.* **2006,** *79* (1), 82-93.
2. Kim, J. M. *et al., J Adhes Sci Technol.* **2003,** *17* (2), 165-178.
3. Fulton, W. S. *et al., Appl Surf Sci.* **2004,** *221* (1), 69-86.

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