

Review on Characteristics and Application of Titanium Oxide

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Abstract- The Nano particles are smaller elements of average size ranging between 1-100 nm. They are capable of bonding with the polymers and other materials to increase their properties. Among which Titanium oxide is a suitable enhancer of properties from the original state to expand the applications in various fields like optical, biomedical, agriculture, ceramics, etc. Titanium oxide itself provides additional strength to the products.

Keywords- Titanium oxide, characterization; applications; property testing.

I. INTRODUCTION

Titanium oxide (TiO₂) nanoparticles are having good conductivity and good chemical inertness which belongs to the classification of Titanium (Ti) to block D period 4 and carbon (O) belongs to block P period 2 having the weight percentile of Ti-79.91% and O- 20.3% with having the appearance of Black color and <200 nm of particle size(TEM). They are mostly used in cutting and wear resistance tool applications instead of tungsten oxide, in optical applications and as a nucleating agent, etc. It should be stored in cool, vacuum and stress free condition.

II. CHARACTERISTIC OF TITANIUM OXIDE

Titanium oxide has the melting point of 1843°C and boiling point of 2972°C. The density and molar mass of the TiO₂ are 4.23 g/cm³ and 79.86gm/mol. The thermal conductivity 5.64W/mk and young's modulus is 310.34 - 379.31 GPa at 100 at the condition of 1000°C Polyaniline composites using metal oxides have wide applications than the pure polyaniline titanium oxide ,these features were characterized by XDR,FTIR,SEM& DC conductivity. The dc conductivity is increased by 50%. The variation is observed above 100°C upto 100°C the dc conductivity remains same [1]. Mesoporous titanium oxide has more significant characteristic like no-toxic, bio compatibility, photo electric performance, photo catalysist it's compact surface properties paved a way of titanium oxide to be used in Li-ion batteries. Simple synthesisation fot titanium oxide is Sol-gel-method [2]. Machineability of composite material titanium oxide,

mechanical behavior, reinforcement, nanostructure, which gives high strength, stiffness, good fatigue resistance, high heat resistance, where heat resistance increases wear ratio also increases [3] Titanium oxide were immobilized on two porous material, they were 1) Activated carbon 2) Natural clay which will be explained in specific tested, XRD, SEM, UV-Photo catalytic degradation & Methyl green in aqueous solution. [4] Nano-crystalline semiconductor have shown a greater impact on industrial world most convenient method of synthesisation of titanium oxide is sol-gel-method where the method has more features like low cost easy available etc. In this process, during calcination when oxygen % increase the yield of titanium oxide decreases [5]. Titanium composites are the most promising composite in engineering. Which has a unique property of high- strength-to-weight? Can with stand static and dynamic loads, with various temperature, physical vapor deposition (PVD) technique allow develop diamond line carbon coating can be dope with titanium Plasma electrolytic oxidation which give corrosion protection and the optimum of friction and wear of titanium alloys. Plasma Electrolytic Oxidation (PEO) provide a variety of variation in composition of surface provide optimization of friction and wear of titanium alloys and improve osseointegration. [6] Titanium oxide achieved in three phase Anatase, Brookite, Rutile. Which depend on preparation method. Basic hydrolysis of titanium tetra chloride by cacination process @ 400°C lead to formation of mesoporous titanium oxide, light absorption (425-600nm) [7]

Titanium oxide prepared by GLAD PVD method, it show nano structured and columnar structure, which character show high surface roughness the developed film show the photo catalytic activity of amorphous Titanium oxide which sow more than 70% efficiency than other methods[8] Nano techonology on textile methods of using nano material on textile by Spraying, printinf, rinsing, washing, & padding. Best properties were , kill micro organism UV-protection durability after 20 cycles of normal washes (detergent) will develop potentially multifunction textile[9] Mechanical fragmentation of titanium oxide gives a good dispersion of the titanium oxide inside surface modification nano particles it also show the mass loss during phase transformation of titanium oxide when handled with heat. [10] The nano titanium oxide used on woven and knitted textiles show good

anti-bacterial properties against two unique bacteria called staphylococcus aureus and kelbsiella pneumonia can be implant in 100% cotton and 45-55% on polyester cotton[11] Magnesium coated with titanium oxide improve biological systems in bone in plantations corrosion rate is controlled new innovative magnesium-titanium oxide improve biomaterials in bone implant metals[12]

III. CONCLUSIONS

Thus the properties of Titanium oxide increases the properties when embedded with the polymers to give a toughness material and extra addition will cause loss of material and various test are taken to identify the phases and composition of the mixed product and comparing the properties to the normal properties and TiC fulfill the properties to the required of the product.

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