ISSN: 0975-766X
CODEN: IJPTFI
Available Online through *Research Article*
www.ijptonline.com

REVIEW ON PROPERTIES OF NANO IN FIBRE OPTICS

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Received on: 10.08.2016 *Accepted on: 06.09.2016*

Abstract:

Nanoparticles has wide range of applications in optical era due to its high surface to its volume ratio.It shows the permitted level of current flow is high and the efficiency of optical scattering is high .This paper reveiws about the scattering and nanomaterials for communication devices and the nanoparticle optical property constraints.

Key Words: Nanoparticles, optical properties, light scattering.

Introduction: Many materials are used in composites like small particles. A material like composite consists of two phases where one phase is filled with continuous matrix and the others are dispersed with a desired amount of continuity in this medium .This dipersed phase usually contains small particles with different types of materials. A nanocomposite is a composite with nanosized dispersed particles in the matrix where the dimensions of the particles are in the scale of nanometer at least in one direction[1]. Nanocomposites are replacing ordinary composites due to their high level properties obtained by decreasing the size of particles in them. They are used in many conditions such as militiary, medical, industrial and advantages based on the material type used in the structure of nanocomposite[2-6].There are some particles such as Titanium which are mostly used for their superior optical properties.Tio2 has a great light scattering ability which enables it to be used in links, fibers, films and many other formulations[6-11]. During the last two decades, significant progress hs been made in controlling and engineering new materials on the level of nanometer length scale like atoms, molecules, and supramolecular structures. These nanostructured materials have generally shown the type of tremendous promise as building blocks for scalable, miniature, and energy efficient electronics, photonics, magnetics, and electro mechanical systems to communicate and the computer transforms in the future. The impact of these innovations in nano materials and nanodevices in reailizing in this vision, and the range of factors that is critical to the success of the

technologies of communication, computing, and utilized sensor networks. Metal oxides, amongst their many applications are an main class of functional materials for chemical properties and bio sensing applications. By continuing the discovery of the sensing properties of these materials, a large variety of metal oxides and their doped variants have been extinsively explored for response of conductometric sensors[6]. Nanostructuring metal oxides on the scales of tens of nanometers allow for the training of their phsical, electronic and optical properties of improved sensory performance [7].

Light Scattering Single and Multiple: The scattering object of light is a single particle..If the matrix is assumed to be amplified and homogenous, the only scattering entity is then assumed to be the particles. In a cluster of single particle interacts with efficiency of scattering is calculated by summation of scattering of each individual particle [12].In this case each particle is illuminated by both the light and the secondary scattering of that from other particles[8].In a cluster of single scattering particles the total efficiency is calculated by summation of the scattering of each individual particle. Because particles is appeared in forms of cluster in aggregate. Clusters are selected as single unit and the total efficiency is gained by summation of the cluster efficiency.

Elastic and Thermal Scattering: The light beam vibrates in different polarization is non polarized planes in its propagation through atmosphere. The polarization plane as a consequence of the change in light beam scattering phenemenon. If the scattered and incident light has identical frequencies elastic scattering and incident light has identical frequencies, elastic scattering of light has occurred.

This takes place when the absolute temperature of the particles is close to zero, otherwise the scattered light is emitted in all frequencies which form scattering of thermal light. On the other hand, light scattering is dependent on the wavelength of the beam and efficiency of scattering each particle should be evaluated for each step of the wavelength the incident beam is usually assumed to be monochromatic.[14]

Absorption and Extinction: The particles are absorbed by scattered light. The absorbed energy can be converted to other forms of energy like heat. Summation of light absorption and the particle is termed extinction by scattering. Extinction efficiency of a particle varies for each polarization component of the incident light [9].

Optical Properties of Small Particles: The theories could be applied to describe different optical properties of small objects according to the size, shape, scattering behaviour of the particles and their matrix. Van de hulst, in 1957 published a book about light scattering of small particles [13]. Bohren had a latest research on some of the optical properties of

particles which made it a base for many researchers to investigate more about them in the field and its related scientific problems[12].In 2004 Miskchenko et al published a work on this subject and kokhanovsky introduced some methods for numerical obtaining better results in 2010[14,17].

Optical Properties of Nano Particles: Many researchers studied the optical properties by utilizing optical measurement appartus like spectrophotometers and others tries to calculate the behaviour of nanoparticles against light. Many researchers have been carried out using metering appartus like spectrophotometers in order to obtain optical properties of nano particles. Y.Zhang et al performed this type of practical research of Tio2.

Colour of Particles: In order to calculate the chromatic values of nano particles in a specific media, a single scattering theory is usually combined with a multiple method. In most cases Mie's theory is used as a single scattering theory while kubelka munk theory is used for multiple scattering since particles are usually densely packed or the media is matte enough. This is the route to which Mcneil and H.French was regarded[15].

Nano Materials for Communication Devices: The demand for seamless connectivity with intelligent ambient systems is increases and unrestricted mobility requires faster transfer data rates, which leads to high memory and computing abilities require in communication devices while ensuring small form factor and low power consumption. Currently more than 70 percent of capacitance on a high performance chip is associated with interconnects and the dynamic power dissipation is larger than that of transistors[1].photonic interconnects such as optical wave guides can carry optical with three orders of magnitude capacity more than electronic interconnects[13].Despite all these attractive characteristics the reasons photonic links are not widely accepted yet are the high cost of the components, size, and integration is difficulty with complementary metal oxide semi conductor circuitary. Direct assortment of integration of semiconductor nanostructures in devices and circuits on single crystal surfaces offers attractive opportunities in areas of high performance communication electronics, optoelectronics and imaging. The thermal expansion coefficient mismatches, material incompabilities and differences in crystal structure[14]. Yi and coworkers recently of highly aligned nanowires on silicon substrates[15].George and coworkers reported the integration of bridged nanowires between a pair of limited oriented non single crystal surfaces on amorphous surfaces. Several barriers still remain that impede this technology transition to real world applications from the laboratory.

Constraints on the Nanoparticle Optical Characteristics: The presence of nanoparticles in the core of fiber optics leads

to loss by optical due to the scattering by Rayleigh. This must be minimized for practical applications. To determine the size of these acceptable nanoparticles for a given application, we use the formula to estimate Rayleigh loss [16] by following. Furthermore, in the case of luminscent ions incorporated within nanoparticles by dielectric, many reports show that their spectroscopic properties can be enhanced of greatly. Note that the index difference between silica and most oxide nanoparticles may be less than 0.3: this would loosen the particle size of the constraint.

Conclusion: Optical properties of small particles were reviewed in this paper, various conditions of particles and their media were employed among them. Single scattering, multiple scattering, absorption and optical properties were discussed.

References:

1. Ajayan, P.M;Schadler,L.S;Braun,P.V;Nanocompossite science and technology ;Wiley-Intersience2003
2. Ulrich,C; Nano-Textiles are Engineering a safer world ;Human Ecology 2006,34,1-5
3. Akhavan, O;Ghaderi,E;Enhancement of Anti bacterial properties of Ag Nanorods by Electric Field and technology of Advanced materials
4. Ingrosso,C; panniello, A; Comparelli, R; A.;Curri, M.L;Stricolli, M;Colloidal Inorganic Nanocrystal Based Nanocomposites
5. Lazar, M.A;Tadvani, J.K.;Tung, W. S.;Lopez,L,;Daoud, W.;A.;Nanostructured Thin films as Functional Coatings. Materials Science and Engineering 2010.12,1-9.
6. S.Akbar, P.Dutta, and C.Lee,"High temparature ceramic gas sensors ;a reveiw ,"Int.J.Appl.ceram.Tec,302-311(2006).
7. N.Yamazoe, "Toward innovations of gas sensor technology," Sens.ActuatorsB Chem.5,7-19(1991).
8. P.R.Solanki, A.Kaushik, V.V.Agarwal, and B.D.Malhotra,"Nanostructured metal oxide base bio sensors
9. Bohren.c. F;Huffman, D.R.;Absorption and scattering of light by small particles 1983,Wiley intersience
10. van de Hulst, H.V.;Light Scattering by small particles 1957
11. Mischenko, M. I.;Travis ,L. D.;Lacias Scattering,Absorption and Emission of light by small particles
12. light scattering reveiws single light scattering and radiative transfer2010
13. S.A.Maier et al.,"Experimental Demonstration of Fiber accesible metal Nanoparticle Plasmon wave guides
14. H.Mori et al .,"GaAs Heteroepitaxy on an epitaxial Si surface with a Low Temparature process