iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** VII **Month of publication:** July 2021

DOI: https://doi.org/10.22214/ijraset.2021.36566

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

Studies on the Behavior of Epoxy Polymer Matrix Reinforced by Carbon Particles obtained from Pyrolysis of Mixed Waste Plastic: A Review

Deepa Agrahari[1], Ashwani Kumar Rathore[2], Deepak Srivastava[3]
[1]*Department of Chemical Engineering, Harcourt Butler Technical University Kanpur*
[2]*Department of Plastic Technology, Harcourt Butler Technical University Kanpur India*

Abstract: ***Commercial Carbon black is produced by thermal cracking of natural gas but nowadays the prices of carbon black are going down at a very sharp rate. The low prices of carbon black resulted in the search for low cost raw material. Most of the researchers focused on inexpensive agricultural waste such as shells of coconut, palm or bamboo. Pyrolysis of plastics is providing an excellent opportunity to manufacture carbon and presents an effective way to recycle non degradable plastics. Carbon element has revolutionized entire material science studies as it provides well developed pore structure and a very high internal surface area. It finds application as adsorbent, catalyst or electrode.***

Researchers like carbon black particles as they can be reinforced into polymer matrices providing a huge opportunity to prepare composites. The properties of these carbon black reinforced composites hugely depend on their origin, processing conditions and chemical treatments. The addition of these carbon black fillers obtained from plastics into polymer composites results in the formation of different microstructures and thus providing different types of composites based on shape, particle sizes and source of origin. The high concentration of carbon fillers results in making highly hydrophobic composites and finds application in making pipelines for extreme weather conditions.

Keyword: waste mixed plastic thermosetting polymer ,surface morphology ,thermal analysis, FTIR, mechanical analysis.

I. INTRODUCTION

Composite is a single material. Composite is made by two or more than two materials. When two or more materials collapse and form a composite. So composite material is a combination two or more than material. Before combination of these individual materials ,they are at a macroscopic level . Individual components have specific chemical, mechanical and structural properties. One component is in the liquid phase and the other component is in the solid or may be the liquid phase . Liquid component is called matrix .It is in continuous phase. materials have a heterogeneous structure. Solid components are in the form of fiber or particulates called reinforcement and these are in discrete phase.

The amount of plastic is constantly increasing. Plastic is being used everywhere in the packaging in medical in the industry. These plastics cannot be completely destroyed. Some industries are recycling and using this waste plastic. Some industries are trying to make new types of materials using this waste plastic. Due to the stoic plastic lightweight low cost, it is used in many places. Because plastic is lighter, we use glass, wood, metal etc. instead. The volumes of waste plastics have been steadily increasing. This waste plastic cannot be completely eliminated. Due to the increase of this waste plastic, pollution of the environment is causing water pollution, land pollution, river pollution. This waste plastic cannot be completely eliminated. In many places, these wastes burn the plastic and how the poison obtained after burning it is a participant in air pollution. In many places you burn these waste plastics and the toxic gases that are obtained after its burning are part of air pollution.Green house effect is also being affected due to air pollution. We are using this waste plastic to prevent environmental ecological pollution. They are using this best plastic to remove the problem of environmental ecological pollution. In our study, we are trying to make a new type of composite material using this waste mixed plastic. We use this waste plastic as carbon black, which we get after paralysis of mix plastic. Mixtures get the best plastic carbon black from the industry. getting the mixed waste plastic carbon black from the industry. Waste mixed plastics include polyethylene polypropylene poly style in poly vinyl chloride poly style. This process is called paralysis when we gently heat the waste mixed plastic on temperature in the absence of oxygen. Carbon black is obtained as a solid product when the best mix to plastic is paralyzed at maximum registration time. This solid product depends on the trade temperature pressure registration time.

©IJRASET: All Rights are Reserved

When waste plastic paralysis trades at a very low temperature minimum and the register time is maximum, the solid product is obtained in large quantities. In this paper, we are using the same car ban black as fiber or enrichment material to make composite material. Solid products have excellent cavities or porous structure. The same solid product is used for making fibers and for the matrix of epoxy for making composite materials. Making of composite by carbon black use as fiber is application in road surface construction or building material. For preparation of carbon black firstly mixed plastic ie PE PP PET PS OTHER IS kept in reactor then heating without oxygen with maximum residence time and at very low temperature with low heat rate .then reaction is take place and plastic is converted in to wax and gas .liquid petroleum oil or aromatic matter is made by wax .then after some time plastic is converted into solid residue this solid residue is called carbon black .physical composition of solid product like volatile matter fixed carbon and moisture ash are obtained by proximate analysis and chemical properties likeO M AND S is find by ultimate analysis .and heating or calorific value are obtained by bomb calorimeter .for mixed plastic have PE PP PET PS have optimum temperature 400to 600 .mixed plastic have 49.35 % of weight of carbon black.

Carbon black n this modern time, carbon black is very widely used as a discontinuous phase as a reinforcement material to enhance the physical, thermal, electrical, mechanical properties of composite. There are many types of carbon black. The industry mostly produces thermal carbonblack, channel carbonblack, furnace carbon black, lamp carbon black, acetylene carbon black, in different methods, which have different physical, mechanical and chemical properties. Due to sufficient surface particle size ,It is being used in areas like Composite Ink, Coating to enhance the efficiency of conductivity, thermal stability, tint strength, ultraviolet registrations, smooth and glossy, viscosity, porosity weighting, nano dispersion properties. The physical structure of carbonblack is same as graphene ,carbon nanotube and have crystalline amorphous carbon element .it is produced by incomplete combustion of aromatic hydrocarbon at operating condition of slow residence time with high temperature low heating then hydrocarbon chain of C-H bond is break and convert carbon black or crystalline amorphous carbon.

Highly cross linked thermosetting oxirane chain polymers are widely used in making composite as a continuous matrix phase .epoxy polymer absorber excellent properties for making composite properties are weather resistance , fluid resistance , excellent thermal ,better mechanical strength, electrical resistance. Epoxy resin is moderately viscous, better adhesive and transparent liquid ..the viscosity of epoxy is increased from 100 to 1500000 centiposics

That's why epoxy behaves as a non-non- non-newtonian fluid . 2 or more than 2 ethylene oxide or epoxy functional groups are presented in epoxy resin. Two type of epoxy are used in laboratory. Diglycidyl ether bisphenol-A (2 ethylene oxide) ,novel tetraglycidyl ether 4-4 - diamino diphenyl methane.in epoxy fiber composite hardener is most important for curing of composite .cured composite is being hard by polyamine ,phenal, thiol hardener

Epoxy resin is a thermosetting gardnery reading the research paper, we find out which rain force material should be selected in your study to ensure that the stand of low opposition is good. Here we select carbon black as rain reinforcement material. By reading the paper related to carbon black, we can identify the morphological properties of these carbon black JAN CHAN HUANG: By reading this paper, it is known that the use of carbon as a conductive pillar in polymer. Physical properties for electric conductivity have been studied here.black pearls vulcan×c72 ELfx vulcan have diameter 12 30 20 20 nm and DBP Absorption cm^3/ log 330 178 981 voltiles 2,1.5 1.4 carbonis use a loading material .Metal rheology studies the physical properties by looking at the surface structure of carbon black.

1) *J Bis Cor , Be Warren:* In this paper, X-rays are studied on the differential condition of carbon black. By heating carbon black at different temperatures, we get information about the change in its function. In this paper, the cluster of carbon black is measured by microscopic count surface area electron microscopic.
2) *Merton ,l. Studebaker:* to study this paper author tells about chemistry of carbon with vulcanization .Carbon Chemical properties of carbon have been shown to be reactive catalytic properties in this paper.
3) *Ch Jager Th Henning Robert Schlogl Otto Spilleche:* Studying this paper shows that the internal surface of carbon affects the optical behavior of other substances. In this paper, information about how the internal porous structure of carbon is different from other substances is given. The inner surface receives information from the high-resolution transmission electron. T JAWHARI ,A ROID ,JCASO: Raman spectroscopy is used for characterization of carbon black. Raman spectroscopy give excellent data for a bout microstructure carbon.In the paper Carbon's infrastructure bandwidth frequency transmission and amorphous features are explored.

©IJRASET: All Rights are Reserved

4) *Christopher ,M Long ,Marc A Nascarella Peter A Valberg:* Carbon Black Carbon Nanotube Fullerene & Griffin Have Carbon Airborne Particle. These are used with other material Carbon, by joining with another material, increases its physical mechanical properties. Carbon based airborne particles are used everywhere due to their structure. In the paper given below, we study different types of raw material matrix rain post material preparation process preparation to make less opposite. Which technique are we using for testing the sample, we are also studying it in the paper?
5) *Pallavi sindlw. Dr s.s chawhan:* To study of this paper research use coconut shell charcoal as an informant material, epoxy use a matrix. Charcoal is found by paralysis shell cell in close reactor. In this paper epoxy and hardener composition it is the ratio of the 10 to 2 with charcoal composition in 5 10 20% weight. The Specimen Testing Is Done By Mechanical Strength That Is The Tensile Test Bending Test İmpact Test.
6) *Merve Soğancioğlu Erraye Gülnare Ahmetli:* After reading this paper, the research discovered after paralysis of polypropylene used the solid product as reinforcement material. And the epoxy component has been used for the metrics. In this, solid products obtained at different temperatures are mixed with epoxy by using different compositions to create a comopposite. Select 300 400 500 600 700 degree centigrade temperature for different compositions. The samples thus obtained perform a mechanical physical thermal analysis. Also analyze the water consumption behavior for water. And water absorption and mechanical behavior at 300 degree centigrade solid product shows ideal behavior. The mechanical properties of the sample in the paper show the ideal behavior at 300 degrees centigrade. And at 700 degrees centigrade, the sample shows best physical properties such as hardness 12.5%.
7) *Danuta Matykiewicz:* After reading this paper, it is known that arthur hybrids make upoxy less opposite. In which epoxy is used to modify it in powder form. And the fiber is made of glass carbon basalt fiber metal with rain force. Taking epoxy in powder form increases the mechanical physical properties.in these Handley Technique is used for making Come opposite. The mixture of sio2 in nano form with epoxy show excellent properties 8% upto.
8) *Prashant Srivastava Chetan Kumar Garg:* In this paper, author human hair is used as hair fiber And using HDPE polymer for metrics.For making less exposed hair fiber is used with 0510, 15% composition. And Mechanical Behavior Is Compared With Treated And Untreated Fiber. Water absorption test is increased due to chemical treatment.
9) *Aamer Khan Patrizia Savi Simone Quararta:* In this paper author study on carbon black and biochar in the form of carbon nanotube! as reinforcement material with epoxy composite. And Utilization of rain force component and metrics properties for making less exposed component. And tested the mechanical and physical properties of samples with different composition at low heating of biochar is giving excellent mechanical properties. Mechanical properties of carbon black nanotube with 4% is giving excellent properties S compiled 20 weight percent of wood biochar.
10) *Merve Soganc Yel Gulanare Ahmetls:* By reading the paper we get some information which is as follows .The 2 run postman material here uses high density polyethylene and low density polyethylene waste plastic. The char product obtained by paralysis of these waste plastics is used with an epoxy polymer to form a low contrast. Here high density polyethylene char with epoxy and low density polyethylene char are mixed with epoxy to form two different types of composite. In this way, two differently formed low contrast mechanical and structure properties have been tested. Thus let us compare the property of composite.in these high density polyethylene and low density polyethylene pyrolysis at 300 to 400 degree centigrade.at 300 degree centigrade high density polyethylene make less exposure to more excellent properties. The low contrast made of HDPE char shows more ideal behavior.
11) *Shilpi Tiwari Cl Gehlot Deepk Srivastva:* in this paper author takes the fly ash and nano caco3 as filler reinforcement and epoxy is as matrix... no particles give better strength of mathematical and chemical behaviour . These compounds are made by 10% fly ash with 0 1 3 5 weight % of composition caco3. Then composite of epoxy and fly ash and caco3 have 52.41% tensile strength and enhance the flexural and impact strength 42.36% and 43.24% about composite 3 weight % .result due to adding of nanoparticle enhance the mechanical property.
12) *Ozaytekin And Kar:* AFTER this study paper we found that composite shows enhance mechanical properties and low time increased conductivity by mixture of polyethylene tera pet char is produced at 45 temperature.

II. CARBON FIBER

it is highly used in defiance sporting aerospace , technical application. due to carbon have nano diameter nano form of carbon canton high stiffness and strength to weight .these nano form fiber are widely used for making composite .carbon fiber found two grade .first grade of carbon have high modulus, less strength.second grade of carbon fiber have low modulus and high strength.

©IJRASET: All Rights are Reserved

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

III. EPOXY RESIN BASED ON THERMOSETTING POLYMER

Due to increase the interesting area of fiber polymer composite epoxy resin are widely used as thermosetting matrix .epoxy have highly mechanical strength ,good electrical resistance, good corrosion resistance, good fluid's resistance, good chemical resistance .epoxy resin have moderate surface tension and good adhesion ,cracking resistance, epoxy resin have highly cross linked chain due to this reason epoxy have limitation of their intrinsic brittleness.

Nature of epoxy is moderate viscous and high surface tension . transparent liquid fluid .in surface tension temperature coefficient of epoxy is -0.074 dyne cm-c .and viscosity of epoxy is increased from 100 cps to 1500000 cps (centipoises) . If sufficient pressure is applied in fiber then epoxy is properly wet the fiber .epoxy resin have two or more epoxy or ethylene oxide rings .if epoxy resin have two ethylene group then this epoxy is called DIGLYCIDYL ETHER BISPHENOL –A . this epoxy is selling by Atul India limited. epoxy is parched from ATUAL INDIA LIMITED .IT IS USE in the form of LAPOX GRANITO JR 150 EPOXY RESIN. It is a two component modified epoxy based on composite. Recently work on the novel epoxy DOW DEN 438 TETRAGLYCIDYL ETHER 4-4 –DIAMINO DIPHENYL METHANE (TGDDM). For making polymer matrix composite. *In 1936, Dr.CASTAN of SWITZERLAND and Dr. GREENLEE* of the united state of america discovered epoxy resin. The matrix of the composite can be either composed of thermosetting or thermoplastic polymer. Thermoplastics have to mold at elevated temperature, as compared to thermosetting. Thermosetting has a cross-linking, three dimensional network and highly strong structure. So the main attention is based on the thermosetting polymer such as epoxy resin. The epoxy resin is synthesized by the condensation reaction of epichlorohydrin with bisphenol. In epoxy resins, ECHOCH2 is a reactive group. Epoxy resin contains more than one epoxide group, oxirane or a glycidyl group. According to the oxirane group the epoxy resins are classified into many types. The epoxy system contains two parts, one part is resin and the second is hardener (curing agent). The glycidyl group of epoxy resin reacts with the reactive hydrogen of the curing agents such as aromatic amines, aliphatic amines, polyamides, phenols, and thiols. On the mixing of resin and hardener a chemical reaction proceeds which cures the material. Generally, Amines are used as healing agents because Amines contain reactive hydrogen, a bond with nitrogen which opens the epoxy ring to form a chemical covalent bond. On curing, epoxies have lower shrinkage. The temperature of the curing of epoxy resin is determined by the chemical composition of hardeners. The temperature range varies from 5 to 1500C. As compared to low temperature cured epoxy systems, high temperature cured epoxy systems show higher glass transition temperature, tensile strength, and stiffness .Many conventional materials are replaced by epoxy resin due to its superior properties. The enhancement in mechanical and physical properties can be obtained from the incorporation of various fillers

For preparation of composite curing agents are very important to make the hard of composite curing agents are many actualities like polyamine, phenol ,thiole but in this report polyamine are used as hardness for curing of epoxy resin. The ratio of epoxy and hardness is used mostly 4 to 1.

Characterization of epoxy resin

physical and mechanical properties	inference
hardness	.085GPa
tensile strength	58MPa
compression strength	90 MPa
density	1.1gm/cc
thermal conductivity	.363w/m-k
coefficient of thermal expansion	62.83ppm/0c
⁻×glass transition temperature	98 c
electrical conductivity	0.105⁻×10 ^-16

©IJRASET: All Rights are Reserved

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

IV. PROPERTIES OF COMPOSITE

1) *Based On Mechanical Properties :* Mechanical properties of composite material are studied according to mechanical behavior of individual components which involve making composite individual components like fiber and matrix have excellent physical and mechanical properties .That means composite properties totally depend on matrix and reinforcement matter. The applied load on specimens is also dependent on orientation of fiber.

Composite materials have two specific intrinsic properties .

a) Isostrain

b) Isostress

If the long fiber in the matrix is parallel to applied stress which has force applied per unit area is called isostrain.and if long fiber is perpendicular to applied stress is called isostress.

to determine modulus of elasticity

Based on isostrain conditions, applied load is parallel to a fiber , in that case strain of reinforcement matter and matrix are equal. equation is given by isostrain condition

$$E = Er = Em = Ec$$

E indicate strain, c indicate composite ,r indicate reinforcement, m indicate matrix

According to young s modulus equation represent

$$Er = \sigma r / er \;,\; Em = \sigma m / e\, m \;,\; E\,c = \sigma c / ec$$

Where is represented stress and e is represented modulus

$$ec\, Ec = Vm\, Em\, em + Vr\, Er\, er$$

Where V is volume friction of fiber and matrix

$$Ec\, ec/E = Vm\, Em\, em/E + Vr\, E\, r\, er/E$$

According to above equation finally found the modulus equation i,e

$$ec = Vm\ em + Vr\, er$$

The modulus of elasticity of composite in the isostrain case is proportionally equal to volume fraction.

Determination of modulus of elasticity based on isostress condition

If applied load is perpendicular to fiber then isostress condition is take place in component before fracture of composite.in that case stress of composite is equal to stress of matrix and stress of reinforcement material, that is,

$$\sigma m = \sigma r = \sigma c = \sigma$$

σ is indicate stress

$$\sigma c = e\, c\, E\, c \quad \sigma r = e\, r\, E\, r \quad \sigma m = em\, Em$$

$$ec\ Ec = er\ Er = em\ Em$$

and $Ec = VrEr + Vm\, Em$

$$\sigma c / ec = Vm\, \sigma m / em + Vr\, \sigma r / er$$

using above equation finally find the ultimately modulus equation, that is

$$ec = em\, e\, r\ /(Vm\, er + Vrem)$$

From this equation modulus of elasticity of composite is decreased which increases the volume fraction of fiber.at iso stress condition.

©IJRASET: All Rights are Reserved

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

V. RAW MATERIAL AND PROCESS TECHNIQUE

A. Raw Material For Fabrication Of Carbon Black Reinforcement With Epoxy Composite

In our investigation different material used for production of carbon black of polymer wastes epoxy composite. about these type of material explain

1) *Waste Mixed Plastic Material:* It is coolected from JAI AMBE PLASTIC TRADERS SURAT in the the form of HDPE, LDPE,PE,PP,NYLON, TEFLON, PS, ABS, FRP,
2) *Epoxy Resin Based on Thermosetting Polymer:* Epoxy is parched from ATUAL INDIA LIMITED .IT IS USE in the form of LAPOX GRANITO JR 150 EPOXY RESIN with chemical nameDiglycidyl ether bisphenol-A (2 ethylene oxide) .The ratio of epoxy and hardness are used mostly 4 to 1.
3) *Hardener Or Curing Agent:* LAPOX GRANITO JH 350 hardener is found with epoxy which was purchased from atual india limited. it is use for cure of composite .after curing it is show best penetration and glass properties.the chemical name of curing agent is tri -ethylene -tetramine and molecular formula is(NH2CH2CH2NHCH2) 2 .the color of curing agent is yellowish
4) *ACETONE: It* has a kito group -co .The chemical formula(CH3)2CO. acetone is a volatile transparent flammable fluid .For clean of equipment, tools, in the laboratory it is used as a solvent with water and clean. due to solvent nature ,acetone is used for manufacture of methyl methacrylate and bisphonal A. then its production in 2011is 678 millen ton.for synthetic fiber ,solvent is a excellent solvent (CH3)2CO is used in making composite as a thinner for epoxy resin.

B. Process And Method For Making Carbon Black By Waste Mixed Plastic

Furnace process technique are used for production of carbon black .In this study scrap waste mixed plastic is kept on endothermic close heat reactor at operating temperature 200 to 500° c and residence time 48 hours in absence of oxygen then hydrocarbon of plastic is firstly decomposed into oil form of hydrocarbon after tha some time it is converted into ampoharius solid crystalline carbon as yield product. The size of dark black colour solid product is mechanically and thermally reduced by ball mill crusher machine in the form of nanoparticle. The diameter size of nanoparticle solid carbon black is 20 to 90 nm and surface area is 20 to 1600 ㎡/g .

C. Process And Method For Making Specimens

In our investigation for making carbon black epoxy composite by vacuum with ultrasonicator technology . Firstly carbon black found from waste mixed plastic is measured from a digital weighing machine .After that weighing carbon is mixed with sufficient weight of epoxy and hardener . In moisture epoxy and hardener ratio is 4: 1 take . Therefore epoxy carbon mixture is found with different composition .Then the mixture is put on an ultrasonicator. The mixture is mechanically agitated with high speed shear mixing. Homogeneously distributed mixture takes place by ultrasonication vibration .Results uniformly carbon black are mixed with epoxy. Such that epoxy is reached on the porous surface of a carbon particle . Such a uniformly distributed mixture is found and a multi sonicator switches off. After a few times a well mixed mixture has some air bubbles .For achieving excellent strength of composite , remove the air bubble from the blend . To remove the air bubble from the mixture, take it in a vacuum reactor for half an hour.And because of the vacuum pressure the air mixes get over and we get the final solution which is free from air bubble.We take a steel mold which is painted over the silicon releasing wax .Now fill the final solution with wax coating steel mold and leave it for72 hours at room temperature . it take 72 hours instead of 24 hours because the sample breaks due to cold weather.After 3 day we take the frozen sample out of the mold sheet .In this way, we get a new type of composite from the final epoxy carbon black solution. With the help of this method and technology, we prepare a sample with five different compositions. We do thermal physical mechanical characterization of these samples

D. Characterization Of Mechanical Behavior Of Specimen

1) *Ultimate Tensile Strength:* For tensile observing, the sample is made from flat dog bone geometry .To test the tensile strength prepare a sample with five different compositions. Tensile property occurs in intensive bulk properties .Ultimate tensile stress scheving by test of tensile for sample .in strain- stress curve ultimate tensile stress is a peak point of the curve. So maximum stress is gained before fracturing for testing is called ultimate tensile stress. For mechanical properties testers ,Screw driven machines with INSTRON 1195 type of model are allowed for measuring the maximum stress of specimens . Testing is done by a screw driven machine at 5 mm/min uniform strain rate with 50.149 mm gauge length and area 62 sq mm by stroke mode. for tensile test.a axial load is applied in a flat sample by standard test method until sample is failure. In tensile properties , analyzed elongation ductility ,tensile modulus stiffness, yield behaviour.

©IJRASET: All Rights are Reserved

2) *Impact Strength:* For impact absorbing sample is make V notch geometry y shape with dimension 63.99 length 12.68 mm width 3.15 mm thickness .test cassette of machine is allowed for measuring of horizontal position of composite sample IZOD fracture toughness test is done by standard mean of ASTM D256 for measuring of impact resistance of component of sample from swinging pendulum. When the vice of the toughness machine is adjusted with the sample at operating condition the pendulum moves and hits the V notched side of the specimen then sample is being cracked then absorbed kinetic energy of fracture sample before break. Izod impact is a function of kinetic energy that needs to be sampled for fracture so that impact strength is directly proportional to absorbed kinetic energy in joule and inversely proportional to thickness of the sample in mm.

E. Characterization Of Physical Behavior Of Specimen

1) *Surface morphology or scanning electron microscopy (SEM):* For sem testing Take tensile samples of fracture pieces. Sem techniques are allowed for scanning the fracture surface of tensile samples by electron beam to achieve a high resolution micro nano surface image at nanospace performance . And analyzed the physical properties of specimens . Here the surface image is taken by FESEM instrument with model MIRA 3 LMH(TESCAM) operated with 10 KV voltage at width 50.13 mm nanospace performance.Because the best mix plastic carbon black epoxy low contrast maintains very low conductivity properties. To increase this conductivity property we clean the flat surface with acetone and apply a very thin coating of carbon. Scanning of the fracture specimen is done by AU or gold metal sprayed on the micro thin surface of the sample. High Vacuum evaporator is work for coating of au metal on the surface.dispersion of solid carbon black on liquid epoxy is examined by scanning electron microscopy testing .
2) *Fourier transform infrared spectroscopy (FTIR):* With the help of FTIR we get the transmission of samples and the infrared spectrum of emission and absorption .With the help of FTRI, we will find the different compound like organic in organic compound in the sample and its functional group ,chemical bonds and various structures.Here, people are using the FTIR technique to know about the unknown organic or these organic functional groups present in the cured sample.FTIR Mathematically converts spectrum into actual data.on here wavenumber range is 500 to 4000 cm-1 is comes on FTIR analysis.
3) *Water Polar Solvent Absorption:* Moisture content absorbed in specimens is dependent on immersion time.preparation of sample for moisture content absorbed testing is done by ASTM D590 technique.Dip all the weighed samples in a separate flask filled with distal water for 24 hours. After 24 hours, take out the submerged sample and dry it on tissue paper immediately and immediately weigh the wet sample.Perform this process continuously for 6 days. In this way, we prepare 6 wet samples of all specimens.

Percent of wet content of the sample is measured by following equation

$$Mt = ((Wf-Wi) / Wi) \times 100$$

Where Wi is initial weight of dry sample before immersion
Wf is final weight of wet sample after 24 hours
Mt is the rate of wet absorption of samples.

At any time t , If wet sample have D diffusion coefficient and h thickness then
In carbon black epoxy composite, water absorption properties is examined by Fickian or non -Fickian diffusion parameter according to equation is

$$Fs = (4/h) (Dt/3.142)^{1/2} = Mt/Mm$$

Where Mm is % of maximum wet absorption of the sample.

F. Characterization of Thermal Behavior of Specimen

1) *Thermal Gravimetric Analysis (TGA):* TGA MODAL SDT Q600 type of TA TGA instrument are employe for observation of the behaviour of thermal stability and kinetics of chemical decomposition of 5-11 milligram of crusher curing sample using on platinum disc under the experimental condition of flow rate 99.99 mL/min and ramp heating rate 10°C/min over the temperature 800° in the presence of 100KPa N2 atmospheric gas . TGA is a function of change in weight or decomposition of sample with respect to change in temperature or time at sufficient condition.change in decomposition or weight of sample during temperjìature change is measured by TGA technique.

©IJRASET: All Rights are Reserved

2) *Differential Scanning Calorimeter (DSC):* DSC 25 modal TA instrument typer of the differential scanning coloriment 2-00918. Are operated for scanning of the curing behaviour of waste plastic carbon black epoxy composite. it's widely used for specimen characterization on the basis of heat flow rate .8 -17 mg of uncured mixture sample is take into Tzero calibration aluminum pan.testing is done with starting temperature 300°C at experimental log of ramp rate function 10 c/min in presence of nitrogen gas . DSC works on the principle of change in enthalpy by change of chemical and physical properties of specimens .Its function of time and temperature both. Heat flow rate differences between sample and inert reference is measured by DSC technique.
3) *Area Of The Work Proposal:* In the review paper study, composites containing solid nano carbon black obtained from Pyrolysis of mixed plastics were used as filler in liquid epoxy resin matrix (DGEBA JR 150 epoxy) with help of poly amine curing agent. The laboratory ultra sonicator was used to mix carbon nanoparticles with epoxy resin at the various concentrations in weight % of carbon black. The mechanical behavior of samples was characterized using UTM and water absorption studies were carried out. The tensile strength of prepared composite was found to be between 30.10 MPa to 39.23 MPa at moderate incremental weight percent of carbon black and water absorption decreases with the increase in concentration of nano carbon particles.

VI. CONCLUSION

Nano carbon black waste mixed plastic epoxy composite is multicomponent with advanced properties being eco friendly and it is used widely in marine ,medical defence automobile electronic areas of application. Following conclusion comes from the result.

1) Tensile strength of moderate incremental weight percent of carbon black with epoxy matrix has an optimum value between 31.16 MPa to 39.23 MPa. whereas a neat epoxy composite has a minimum optimal value 10.24 MPa.
2) Impact strength linearly increases with increase of weight % of carbon black in epoxy resin.
3) The moderate moderate incremental weight percent of carbon black composite has a maximum residue yield at600 to 800°C than near epoxy due to these improved thermal stability **4** Due to increased composition of carbon black in epoxy,carbon black reinforcement with epoxy has a magnificent response of mechanical strength.
4) In FTIR spectrum curve cure neat epoxy have high intensity broadband, 910.12 represents coc bond presence of oxirane group epoxide linkage indicating c-o-c oxirane ring functional group.

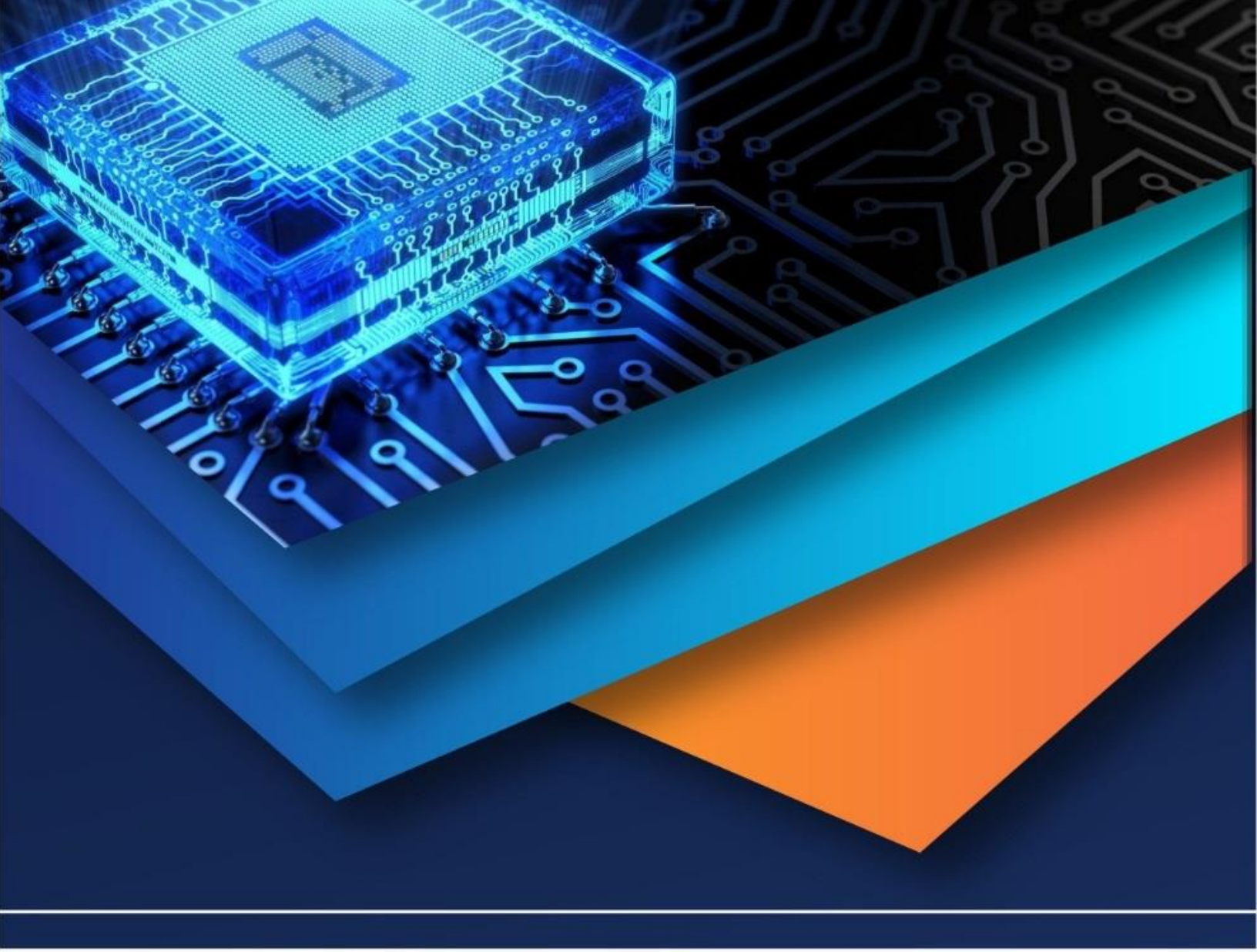
VII. ACKNOWLEDGMENT

This project work is hardly supported by my Guide and co guide. I express my sincere thanks.

REFERENCES

[1] Vivekanandhan chinnasamy, sampathpa pavayee subramani sathish kumar palaniappan bhuvaneshwaran Mylsamy, karthik Aruchamy 2020 doi 10.10161 Jmrt 2020 .o1.o1
[2] Akarsh verma, kriti baurai m.r.sanjay suchart siengchin 2019 doi 10.10021/ pc .25373
[3] Merve soganciogluEcrayel gulnare ahmetli 2018 doi.org /10.1007/s11356 - 019- 07028- 3
[4] Shafferina dayana anuar sharuddin , faisal abnisa ,wan mohd ashri wan dawd mohamed kheiseddune aroue 2016
[5] Aamir khan ,patrizia savi simone quaranta ,massimo rovere, mauro giorcelli alberto tagliaferro 2017
[6] Farman ali, muhamad waseem, adeel afzal 2020
[7] B.d.s dheeraj, harikrishna ,R,Jitha.Jayan, appukuttan saritha kuruvilla Joseph 2019 21 .10 421
[8] Gulnare ahmetli, suheyla kocaman,11 kay oztekin pinar bozkurt 13 doi 10.1002/ pc 22452
[9] Merve soganciogluAsroyal gülnare ahmetli 2017
[10] Y H muhammad , s ahand, J.reinforcement, plastic composite 2013 329.612
[11] W.zhang .rs black burn, A .A Dehghani sanig Jmater sci 2007
[12] A mohammad and G.P simon AHmetli G,kocaman s, ozaytekin Bozkurt 2013
[13] Encinar Jm ,Gonzalez Jf 2008
[14] Mastral Am,murillo R ,call N m s Garca T snape C z 2006
[15] Wiliams P T ,Besler Taylor DT 1990
[16] J.therm.Anal.colorim 2013
[17] Nagarajan, v monanty AK misra 2016
[18] Shilpi tiwari ,Deepak srivastava chhagan gehlot 2020

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)