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Mechanical and Thermal Properties of poly butylene succinate (PBS) Nano Composites

***Sathiyaraj Chinnasamy, M. Ramachandran, Sowmiya Soundharaj**
REST Labs, Kaveripattinam, Krishnagiri, Tamil Nadu, India.
*Corresponding author Email**:** sathiyaraj@restlabs.in

Abstract. The active substance of Catalyst TiCl4 and the microcrystalline is MgCl2. has been Polybutylene composites, Mechanical properties, Thermal properties, Nan composites, Biodegradability, Morphology; these catalysts contain organic compounds belonging to the class of special modifiers, esters or ethers. Pre-catalysts Organo-aluminum alloys and other types of organic or organ metallics are activated by a combination of converters. Two of the most important technologies of catalysts support the advantages. High productivity and high content of crystal isotope polymers are manufactured under stable polymerization conditions at 70-80 C. This product is designed to combine your rainwater tank with washing machine and household appliances Toilet bowl. The polypropylene pipe should be physically protected from direct sunlight to avoid long-term UV decay. Bb pipe is lightweight, it has the advantages of being flexible and easy to install. Polybutene is 1-butane, 2-butane and an organism made from its protein compound is polymer. It is similar to polypropylene (PIB), It is made from pure is protein produced on the C4 premises of a large refinery.

Keywords: Polybutylene Composites, Mechanical Properties, Thermal Properties, Nano Composites, Biodegradability, Morphology,

1. Introduction

In general, insurance companies do not provide coverage within homeowner's insurance policies for polybutylene pipes. They are simply too much of a liability as they are easily damaged and will break down, burst, and damage the home. Unfortunately, polybutylene proved to be disastrous. It turns out that the plastic used reacts to oxidants and disinfectants in public water supplies, like chlorine. The result is scaling and flaking from within that creates micro fractures in the pipes that will eventually burst. Polybutene is an organic polymer; it is 1-butane, 2-butene and isobutylene. It's like polyisobutylene (PIB), the C4 of a large refinery Prepared on the premises from pure isobutylene. Mechanical properties are physical properties that express an object during the application of forces. Examples of mechanical properties are flexibility, tensile strength, elongation; Hardness and fatigue range are measurable physical properties. They are density, melting point, conductivity, coefficient of expansion.

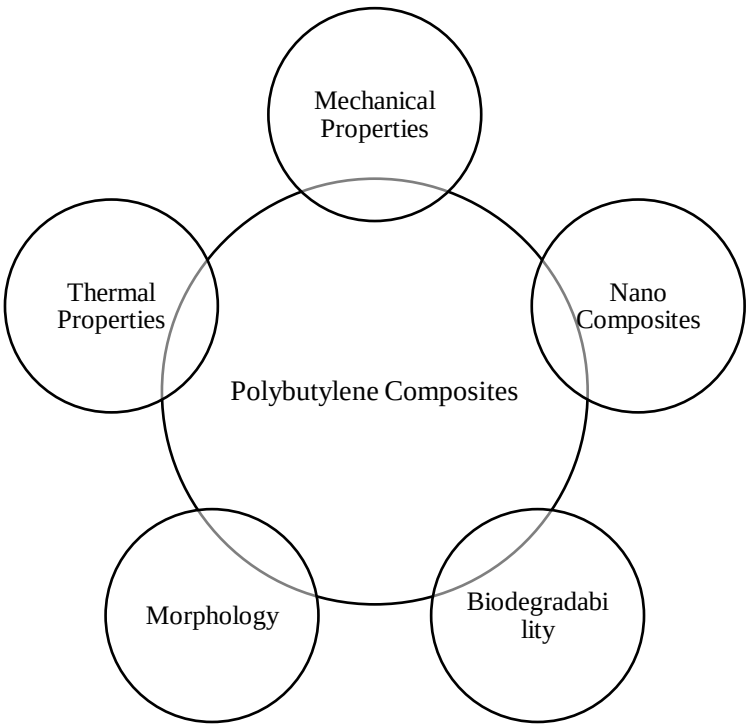

FIGURE 1. Properties of Polybutylene Composites

Various Properties are mechanical properties of how the metal works when applied to them. Strength, durability, wears resistance, etc. In other words, these are the properties that are expressed when heat is passed through an object Tissue engineering, Pharmaceutical distribution and Polymeric for biomedical applications such as cellular therapies Nan composites are used. Polymer and nano of distinct interactions between particles Due to, different types of property combinations own tissue structure and can be designed to reflect properties. Biodegradable materials can be decomposed into some usable forms by natural processes. Examples - human and animal waste, plant materials such as Rubber, paper, wood, leaves, cotton and wool, Carcasses of animals, Kitchen waste, agricultural waste. Morphology is the study of words and their components. Morphemes, such as prefixes, suffixes, and keywords, are defined as the smallest meaningful units of meaning. Morphemes are important for phonetics, vocabulary and comprehension in both reading and spelling.

2. Polybutylene Composites

Polypropylene Succinct (PPS) Poly Ethyl ethylene succinct, sometimes written, It is a thermoplastic of the polyester family is polymer resin. PBS is a biodegradable aliphatic polyester Comparable to polypropylene. It could be Bacilli GSPLA or also referred to as Biopic Mitsubishi Chemical. PPS is a polymerization of butylenes succinct that repeats C8H12O4 units. Repeatable butylenes contain polymerized units of succinct. The first set of Made of succinct acid based polyester in 1863, at that time the Portuguese professor Augustine Vicente Lorenzo in his "Research Sir Les Polyatomic" (Research on polysomic compounds) for succinct acid Formed between ethylene and glycol. The reaction he named "succino-ethylenic acid". When this acid is heated to high temperature (300 ° C) Loses water and one after cooling He noticed that the crystal gains mass. Polyethylene Sachem (PPS) is integrated with Plastic Co. Ltd. of HKH National Engineering Research Centre. PPS melting the temperature is about 114C, and the vicar softening temperature is about 96C. Melting flow index (150 ◦ C, 1.2 kg) 5 ± 1 g / 10 min and density 1220 km - 3. All other chemicals used in this study are of restorative quality and were used without additional refining. Slight improvement in strength at 15 vol%, Fiber reinforcement effect and micro Competition between crack openers the phenomenon may be due to the high load of basalt fibers. Tensile and flexible with increased fiber content Modulus values increase significantly, this is more than seen from the strength showing percentage improvement [1]. Polybutylene Suctioned (BBC, Bangalore #) Offered by Showa Highpolymer Co. Ltd. of Japan. To improve compatibility between PPS and Multi-Wall Carbon, The surface transformation of the CNTs was achieved as follows. First, the purified CNTs were dissolved in HNO3; the carboxyl groups were heated for 120 min at 120 _C in the reflux system. Were introduced at their starting points and the imperfections in their walls. The potential mechanism for CNT-COOH is dry Dispersed into DMF and composite sterile alcohols and N, N0-dicyclohexylcarbodiimide (DCC) is that DCC catalyses externalization will exhibit good dispersion in these modified CNT-C18 organic solvents, Because of a long alkyl chain In the process of resolving solubility plays an important role [2]. Polypropylene Succeed (PPS) resin, manufactured by PTT MCC Brioche Company Limited, is Conventional thermoplastic discharge and needle mounding processing and Used for industrial applications. The biologically based mass fraction in PPS is 50%, which comes from bio-zinc acid. PBS is characterized by density - 1.36 g / cm3, MFI [190 C, 2.16 kg] - 22 g / 10min and melting point - 115 ° C. JP Selecta in vacuum chamber at 80 C Arced dried 8 hours ago Processing, will be used from time to time to achieve the minimum Heat and vacuum pump in the oven power consumption. [3].Manometer Calcium carbonate (nano-CACO3) is a mineral particle; this is due to its reinforcement and drastic effects on the polymer industry and is widely used due to its low price point of view. There are Biodegradable polymers / nano-CACO3 Extensive studies of compounds. So their Applications, Nano-CaCO3 in PBS Filling are the performance of PBS to improve and reduce costs and its applications one of the main methods of stretching [4]. When PCL is mixed with PCL Absence of LTI PLA Biodegradable polymer, Impact strength of PLA with 20 pdl% pcl clearly increases viscous polymer PPS clearly increased to a low level. Preliminary results LTI is PLA / PCL Impact strength of compounds Shows that increases [5]. Furthermore, Cao ET al15 synthesized Zinc acetate and tetraethyl (1, 2-phenylephrine- [azimuthally]) bis (2-hydroxyphenyl ethylene) Typhosonate (TEPAPM) as a reduced metal. 1 wt% of Zn-TEAM and 19 wt% of APP with low density when combined with polyethylene (LDPE), the composite bar was reduced by 32.0%. Aksum ET al16 Iron-reduced poly (Acrylic acid-co-acryl amide) (Fear), It is made with melamine polyphosphate (MPP) Combined with polyethylene (PE). [6]. Polymer selected for our work is polyacrylamide. 450 ml distilled 2 g of filtered water for analysis quality A solution (designated A) is prepared by dissolving the polyacrylamide. Another solution (B) 200 ml distilled It is prepared by dissolving 1 g of analytical grade PbNO in water. For three precursor solutions in glass Petri dishes then a certain amount in distilled water Made by mixing A and B [7]. High density polyethylene (HDPE), Low density polyethylene (LDPE), Comparison of a parameter of polystyrene (PS) and poly (vinyl chloride) (PVC) after seeing, the authors A and C (n are the values for the objects above. As different objects between a and C (n) mw And C (n) m are obtained by combining the values [8].

3. Mechanical Properties

Mechanical properties are physical properties that express an object during the application of forces. Examples of mechanical properties are flexibility, tensile strength, elongation, stiffness and fatigue range. An engineering product or to finalize an item for use, Understanding the mechanical properties of an object Important. Affecting the mechanical properties of an object, mechanical strength of an object and its ability to be shaped into the appropriate shape. Surface change has very obvious effects on the fracture length, This allows the fiber to be easily removed from the adaptive interface area, Biofilm Quick section As a result of the collapse; However, with good adhesion to the PPS matrix the modified fiber can effectively

disperse the modified fiber and change the stress, which leads to the overall decomposition of the bio film. Furthermore, the tensile modulus, which represents the stiffness of the biological compounds, increases with increasing compatibility after the fibber surface change [9].The decomposition of these polymer Chemical bonds in the polymer, the main chain and the chemical in the branch Plays an important role in key chemical bonds, including bonds. As a new biodegradable polymer material, PBS Has grown fast and its good Thermal stability and mechanical properties has attracted much attention due. wood alternative Unique to WPC No wood structure, It also has good mechanical properties, good dimensional stability, Water resistant, abrasion resistant, excellent chemical Resistant, easy to paint, low maintenance requirements, Longevity, easy to design secondary Excellent performance in processing and many more [10]. Mechanical properties of polymer composites are affected by chemical conditions. 5% P (BS-ra-LA) and P (BS-hb-LA) Overall position of PBS / PLA compounds after merging Cross-sections of clarifying specimens By freezing in liquid SEM Are classified. Particles From the cross section of the control model can be seen, and the build interface is clear, I.e. phase separation occurs and the mixture does not match. 5% P (BS-ra-LA) and P (BS-hb-LA) when introduced into compounds, the interface spreads and blurs. And particle-like aggregates will disappear [11]. In the crystallization properties of the PPS matrix Variations in PBS / DPS-DA2 Impact Strength Improvement Did not respond.

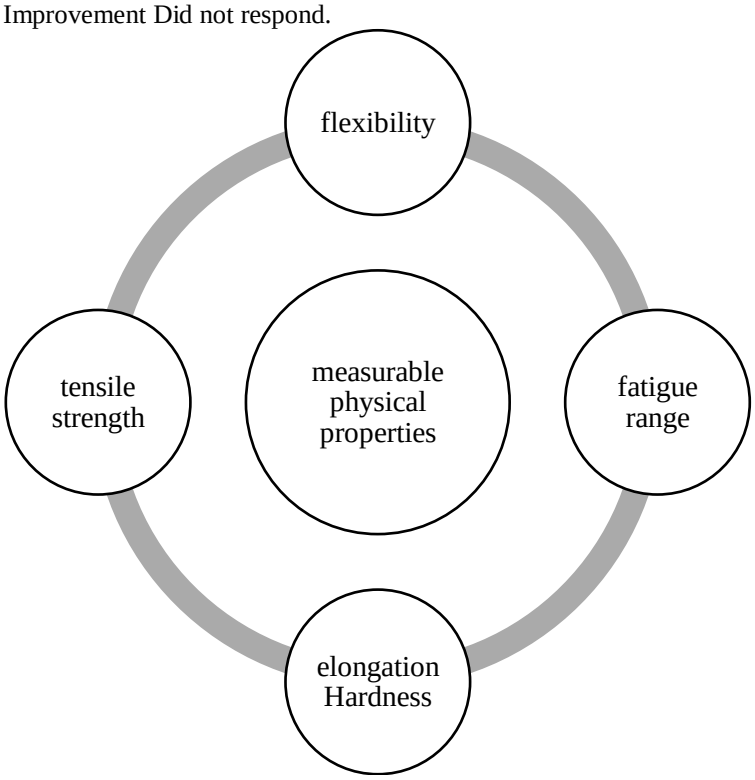

FIGURE 2. Example of mechanical properties

This study with superior mechanical properties for commercial use Easy approach to creating low cost PPS compounds Creates. And the removal of "white pollution" Highly effective in protecting the human living environment, the results are highly encouraging for the development of biodegradable plastics [12]. Temperature-based In Dynamic Mechanical Analyzer (DMA, Q- 800) Storage Modulus of Models (E ′) ASTM D4065 Standard Tone Step 3 ° C / min the heat curve was examined. 1 Hz frequency and 15 m oscillation range E ′ measurements were analyzed using dual cantilever mode. For heating samples from −50 to +100 C previously all samples were placed at −50 C for 5 min atmospheric [13]. First, Thermal decomposition of pure PVA and PVA / PBS nanocomposites100 and takes place in a step between 600 8C. Second, the rest of the masses do well with PVA / PPS Are modified, i.e. PPS Nan particles remain intact after thermal decomposition. Finally, PVA / PbS Heat of PVA in nano composites Stability is higher than pure PVA. Heat of nanocomposites with respect to pure PVA The reason for such an improvement in sustainability is, they are fillers to partially change the molecular motion of the polymer chains May be absorbed at the surface of the particles. [14]. since the matching lines of each section are approximately parallel, Atomic algorithm and crystal growth rate different cooling ratios are the same for all models. As the temperature changes during non-isothermal crystallization, the n and Zt parameters are the same as for isothermal crystallization does not have physical significance [15].

4. Thermal Properties

The thermal properties of materials refer to changes in the temperature of the material and the response for the use of heat. Because a solid absorbs energy in the form of heat its temperature rises and its dimension increases. But different materials work differently to use heat Do. Thermal efficiency, in the practical application of thermal expansion and thermal conductivity solids often the most important properties are heat Properties are the properties of an object associated with trafficking. In other words, heats through an object are the properties that emerge during abduction. Thermal properties of the physical properties of materials come under a broad heading. All doped as a temperature function in the 300 res850 K range

Model Electrical Resistance, See beck Coefficient and Total Thermal Conductivity Figure 2. However, for the slightly induced model, from this trend the deviation is approximately 700 km. Short Band the gaps are significant for the transport properties of semiconductors. Highly stimulated specimens did not show signs of bipolar effect, this is the carrier concentration and temperature studied Single within limits Apply to the band hypothesis [16]. The chicken Alloy plates on a stainless steel axle2 Mm thick at 12 MPA for 10 min 150 Press to C and quickly by fan Refrigerated. Definite representation of the Hot Press [17]. The effect of agricultural or biological compounds Flour in thermal properties Examined in isothermal non-DSC tests. Figure 13 Clean PPS and RHF (200 mesh) -10k min PPS vowel filled in at a ratio of -1 -1 -Provides a second cooling curve for compounds. All cooling of an endodermis Digit peak can also be seen on scanning. The transformation of glass in bio-compounds Accompanied by a sudden change in fundamental state as a result of the change in thermal capacity from the glass state to the rubber-like state [18]. The effect of lignin Studied in the PPS matrix and of the resulting compounds Properties were compared with pure PPS polymer (control). 50% lignin content for PMDI Compounds containing were selected link. Compounds 1 and 2 were combined with wt. % PMDI compliance. Had the properties of compatible compounds 50% compared to lignin-filled compounds and clean PPS properties. The types of properties carried out are discussed below. All results provided are for mechanical properties Copies and heat and three copies for physical properties [19]. The Objectives of this study PBS / HGM compounds and chemical and mechanical properties of PPS / HGM compounds. In this study, the structure and properties of PPS / HGM compounds Basic results for understanding the relationship between microscopic observations, melting and crystallization behavior, chemical properties, Mechanical properties and thermal stability [20] will be discussed. The main heat of the studied compounds, the properties and MFR values are reported in Table 3. Thermal properties of PA11 and PBS- 7 2 mg. Each sample was initially heated to 25 to 230 C for 20 Cumin 1 (PA11-based products) [25 to 180 C 15 C min 1 (To clear PBS-based thermal history and then [21]. PPS as determined by DSC measurements the thermal properties of the compounds shrink, Mechanism of PPS nanocomposites when attributing properties, the size of the crystal (influence) PPS components in the compounds may vary with the influence of the organoclave [22].

5. Nano Composites

A nanocomposite is a multifaceted solid with one, two or three dimensions per 100 nanometers at a point (nm) between different phases that is low or forming structures having repeated nanoscale distances. The idea behind nanocomposite is unprecedented Creating new materials using flexibility and the nanometer improving their physical properties using range dimensions. In the broadest sense, micro-media, by this definition, Includes colloids, gels and copolymers. But usually by differences in structure and chemistry Total matrix and nano-dimensional that vary in properties Grid (s) refers to the solid composition. Mechanical, electrical, thermal, for nanocomposite Optical, electrochemical and catalytic properties Vary considerably from component to object. Nanocomposites can be used in the field of tissue engineering that suggested it. Hence the osteoblast cells in the present study of compounds for cell adhesion and proliferation using we studied cytocompatibility. Absorption of each well in an ELISA micro plate reader (Bio-Rad, USA) recorded at 570 nm. Four The mean value was obtained from the measurement of test runs [23] PBS's unique robustness, such as biodegradability, melting process strength, spacing And tensile strength, Polypropylene (PP) and low Comparable to high density polyethylene (LTPE), gives it some intrinsic hard combs, such as PBS. Low melting strength and viscosity, low gas barrier properties. Such shortcomings In view of the wide range of applications, the possibility of obtaining high-performance materials can be overcome by mixed technology. Polymer composites consist of solid multifaceted materials and polymer matrix reinforced fiberglass, which exhibits much more advanced properties compared to older polymers. In the case of nanocomposites [24] this review is based on the properties and homer-based properties of nanocomposites Summarizes studies of the use of PBS as recent inexpensive polyester. How nanoparticles are scattered in the PPS matrix Investigate, producing well-dispersed PPS nanocomposites we used two minerals to identify properties that can be improved by. Clay and zeolite were used as nanoparticles, Because they are well versed in polymer-mineral nanocomposites Known and widely used minerals In our previous work, we successfully integrated double-acting organoclave (TFC) clay surface epoxy groups and high peeling PBS / TFC nanocomposites Prepared this study PBS, PBS / C25A and PPS / DFC compounds crystallization properties study isothermal crystallization kinetics Several equations used two clays presence Crystallization and nuclear power Implementing the process is appropriate as proposed in the previous literature Energy was determined using equations [25]. All chemical synthesis and processing methods are carried out in a dry nitrogen glove box with ppm O2 and H2O. Lead acetate rehydrate and cadmium acetate hydrate Fisher Purchased from Scientific Company. How nanoparticles are scattered in the PPS matrix Investigate, producing well-dispersed PPS nanocomposites we used two minerals to identify properties that can be improved by. Clay and elite were used as nanoparticles, because they are well versed in polymer-mineral nanocomposites Known and widely used minerals [26]. MEH-PPV of 40-70 kDa molecular weights is derived without further refinement or fractionation from Sigma Aldrich Used as purchased. From Sigma Aldrich All other chemicals purchased are dehydrated and further purified were used without. All nanoparticle compounds are 70 (3) wt% nano Contain crystals. It is the weight of the polymer for direct composites and processed gravity is known by weight compounds after drying. [27].With the expansion of the practice PTFE-based compounds Application fields Behavior's or abrasion of friction and lead under the conditions it is necessary to study the PTFE compounds filled with its compounds. It is known that many polymers wear more in water than in air 7-9. Watanabe et al. Wear of PTFE compounds with 10-12 glass fibers only found to be filled [28]. 300-1000 nm wavelength range light normal phenomena Chemosynthesis Genesis 10S model UV-Vis spectrophotometer Optical Absorption data was obtained. National Electrical Association of America (NEC) Tandem Proton-

induced X-ray in Accelerator Model 55DH 1.7 MVPellaton Models Scans the emission (PIXE) matrix high refractive index Produces nanocomposites [29]. First, in the water phase at a leading precursor pH with active hydroxyl groups Synthesized from mercaptopane (ME) and lead nitrate 5-9. Polyurethane (PTU) matrix, the building block of polymer networks, ME In the matrix by polytoxification of hydroxyl groups in the molecule Introduced with pot oligomer isocyanine groups [30].

6. Biodegradability

Magnesium alloys in biomedical applications are a major benefit like heart stents and bone repair, but a quick itch is a barrier, especially in the early healing phase. Mechanical properties of magnesium alloys Retention can lead to corrosion, bio-compatibility and the formation of a temporary surface. In this chapter, magnesium is suitable for alloys Common surface alteration techniques have been introduced; further relevant surface design principles are discussed. The role of these surface transformation techniques is illustrated with further examples, Finally, future trends related to surface design are addressed. The reuse of Biodegradable composite materials and waste resources are thus generated. CO2 emissions from burning biodegradable plastics can be greatly reduced, resulting in O2 loss and minimal CO2 emissions Occurs. However, the price of biodegradable plastic products since it is higher than traditional plastic raw materials, Its commercial acceptance and use is prohibited. Polyester (e.g., polylactic acid (PLA)), Polyhydroxybutyrate (PHP) and polypropylene succinct (PPS) and starching discussions about the transformation of biodegradable plastics in the plastics industry including this is an important topic. -Basic polymers [31].The biodegradability of plastics adds new and additional properties to these materials. To extend their use, these products must be made of iodine in the natural environment, thus they can provide a source of carbon and energy for microorganisms. As defined by established research standards, Degeneration caused by biological processes, especially enzyme activity, in the chemical structure of the exposed material leading to significant changes [32]. The composite plates were cut to 3040 mm to ensure weightlessness of specimens buried in compost soil. Fertilizer Soil composition: 20%water, 20% organic matter, 30% rotten leaves, 5% urea and 5% each other sample buried in compost soil, 30 2 C. are incubated at ambient temperature. Continuous composting should keep the soil moist. Each model is 30, 60, 90,120,150 and 180 respectively. The compost was dug from the soil days after burial. [33].The biodegradability of PBS is mainly due to its chemical composition and is especially important. Depending on the hydrolysable ester bond in the chain, it is affected by microorganisms.) Mixes with chemicals and starch in various proportions. The properties of the mixed samples are considerable Found to be improved, only 10 wt% in RPBS.DTI chemical inserts surface of PPS / starch polymer composite Softening, showing the best incompatibility of the two, However, PPS has a slower crystallization rate, lower melting viscosity and has some negative properties such as tenderness. These control its processing level and potential applications. Or specific to specific work environments with other material less to create new composite materials suitable for the purposes Polymer compound is commonly used. However, most polymers are interconnected Do not mix and are divided into phases [34].The objective of This study was buried in natural soil Study of the biodegradability of bio-flour-filled PPS bio-compounds in the environment For making and simulated municipal solid waste (MSW) When aerobic compost is exposed to the soil. Biodegradable of conventional plastics, PPS and bio-compounds we compared the character. To compare the effects biodegradable soil and compost soil composting, microbial counting was done using CFU [35].

7. Morphology

Morphology of animals, plants and microorganisms in biology, the study of size, shape and structure and the relationships of their components. The term is a biological form and a plant or Refers to common features of the arrangement of animal parts. The term anatomy refers to the study of biological structure, But generally of bulk or microstructure Advises to read the details. However, in practice, both terms are approx. In general, the functions of morphological physiology and organisms and Deals with the study of their components. Function and organization are very closely interrelated; however, their separation is somewhat artificial. Morphologists first examine the bones, muscles, blood vessels and veins and examine the bodies and roots of animals, the stems, leaves and floral parts are superior. Via Na-MMT and OMMT Broken foam forms of modified PLA / PBS The inner hole of the section was examined by morphology, The content of both Na-MMT and OMMT is 3 wt%, It refers to a homogeneous lung [36].The stems, leaves and floral parts are superior Were made of the bodies of plants. Via Na-MMT and OMMT Broken foam forms of modified PLA / PBS The inner hole of the section was examined by morphology, The content of both Na-MMT and OMMT is 3 wt%, It refers to a homogeneous lung SF before and after steam-explosion pretreatment Morphology of a Hitachi S-3700 scanning electron microscope (Hitachi, Japan). Samples before scanning Plated with gold. A portion of hemicelluloses Inactivation produces hydrolysis of organic acid and B-ester. Binding of lignin due to high temperature and high pressure the environment brings C4% increase. The above analysis shows vapors explosion hemicelluloses and lignin Decomposition, separation of incites, in surface morphology Causing changes and a specific surface increase of SFs [37] the shapes of the photo node images and the beautiful TiO2 CE SEM images (Figures 5a and b) distinctive grain borders Without TiO2 nanoparticles interconnected Reveal the network. At aperture dimensions ranging from 20 to 100 nm Due to the microscopic structure it is possible to load large quantities of QDs across the cross section of the oxide. Images of the TiO2-MWCNTs compound (Figure 5C and E) Shows particle morphology, which includes MWCNTs and TiO2 NP Refers to a homogeneous combination of s. This hard morphology is ideal for better absorption of PBS QDs [38].The angle of contact of Water with a surface of various compounds using a focus theta tool Rated (Focus Theta, Pauline Scientific, Gothenburg, Sweden). For this purpose 4 L of water was left on the surface of the material and the contact angle is 1.94V. Measured after, Software results that indicate surface moisture Analysis is a focus. Measurements were done three times. Different test obtained Software results that indicate surface moisture [39] scanning

electron microscope. Electron microscope using the JSM-840 engine (Japan Electron Co, Japan) the morphology of the compounds was found by scanning (SEM). All samples were immersed in liquid nitrogen for approximately 5 min then were perpendicular to the flow direction. Advanced the fracture surfaces were plated with gold to provide conductivity [40].

8. Conclusion

Polypropylene Succinct (PPS) Polyethylene Ethylene succinct, sometimes written, It is a thermoplastic polymer resin of the polyester family. PBS is comparable to polypropylene, It is a biodegradable aliphatic Polyester has properties repeatedly the mechanical properties of the 8H12O4 unit are one in the use of forces Are the physical properties of the object. Of mechanical properties Examples are flexibility, tensile strength, stretching, Limit stiffness and fatigue. An engineering product or To finalize an item for use, Understanding the mechanical properties of the material Important Affects the mechanical properties of an object mechanical strength of an object and its ability to be shaped into the appropriate shape. A thermal property of materials and changes in the temperature of the material also refers to the response to the use of heat. It's because a solid absorbs energy in the form of heat. Its dimension increases as the temperature increases. But different materials use heat differently. Heat capacity, thermal expansion and Thermal conductivity are often important properties in the practical application of solids. Thermal properties of a material related to thermal conductivity a nanocomposite is a multifaceted solid where structures consist of one, two, or three dimensions of 100 nanometers (nm) or nanoscale repetitive distances the various stages of creating the object. The idea behind the nanocomposite is Construction in the nanometer range of their physics using modules unprecedented flexibility in properties and using improvement Create new items. Magnesium alloys in biomedical applications are a major benefit like heart stents and bone repair, but a quick itch is a barrier, especially in the early healing phase. Magnesium to retain corrosion, biocompatibility and mechanical properties a temporary surface may be formed in the alloys. In this chapter, General suitable for magnesium alloys Surface change techniques have been introduced, and the surface associated with its Design principles are discussed. Morphology of animals, plants and microorganisms in biology, the study of size, shape and structure and the relationships of their components. The term is a biological form and a plant or Refers to common features of the arrangement of animal parts. The term anatomy refers to the study of biological structure, but generally advises to read the details of the total or micro structure. In practice, however, the two terms are used almost identically.

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