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Novel Application of Polymer Blends

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Abstract: A polymer blend is a mixture of two or more polymers that have been blended together to create a new polymer.It results in improved augmented or customized property and functionality which can result in significant advantage in our daily life. Polymer blend technology has achieved an important position in the field of polymer science. With increased academic and industrial research interests the application of polymer blend technology two commercial utility has grown significantly. Polymer blends are playing an important role in our lives with potential application due to their being super tough, high elasticity, low cost, lightweight, easily processed. These materials are thus an ideal candidate for modern technology easily processed.The main characteristics of the polymer blend are the miscibility, phase behaviour, adhesion at the interface of blend partner. Polymer blends emerge as one of the important research area in macromolecular science. Due to its wide application potential such as electronics, packaging, automotive, oh household appliances etc .Polymer blending is a physical mixing of atleast two homopolymers to produce a new material which has quite different properties.If successful these techniques provide less time of production and is cheaper than the development of new monomers or new polymerization routes polymer blades have been estimated to represent more than 20% of the total consumption of engineering polymers. Combination of amorphous and crystalline polymers may offer good dimensional stability, chemical resistance, tensile strength, good mechanical properties and ease of processing. Some new innovations are made in this field making the concept more interesting day by day.

Keywords: Polymer blends, PVC, Polystyrene, Mechanical properties.

I. INTRODUCTION

A polymer mix could be a blend of two or more polymers that have been mixed together to form a unused fabric with distinctive physical properties. Generally, there are five fundamental sorts of polymer mix: thermoplastic–thermoplastic mixes; thermoplastic–rubber mixes; thermoplastic–thermosetting mixes; rubber–thermosetting mixes; and polymer–filler mixes, all of which have been broadly examined. Polymer mixing has pulled in much consideration as a straightforward and cost-effective strategy of creating polymeric materials that have flexibility for commercial applications [1]. In other words, the properties of the mixes can be controlled concurring to their conclusion utilize by redress determination of the component polymers. Nowadays, the advertise weight is so tall that makers of plastics have to be give superior and more financial materials with predominant combinations of properties as a substitution for the conventional metals and polymers [2]. In spite of the fact that, plastic crude materials are more exorbitant than metals in terms of weight, they are more temperate in terms of the item taken a toll. In addition, polymers are corrosion-resistant, possess a light weight with great sturdiness (which is critical for great fuel economy in automobiles and aerospace applications), and are utilized for making a wide run of products that incorporate family plastic items, car insides and outside components, biomedical gadgets, and aviation applications .

The advancement and commercialization of modern polymer as a rule requires numerous a long time and is additionally amazingly exorbitant. In any case, by utilizing a polymer mixing handle – which is additionally exceptionally cheap to function – it is regularly conceivable to decrease the time to commercialization to maybe two to three a long time [3,4]. As portion of the substitution of conventional polymers, the generation of polymer mixes speaks to half of all plastics created in 2010. Nowadays, the polymer industry is getting to be progressively advanced, with ultra-high-performance infusion molding machines and extruders accessible that permit phase-separations and consistency changes to be successfully recognized or controlled amid the handling stages. Whilethis cutting edge mixing innovation can too incredibly expand the execution capabilities of polymer blends, increasing showcase weight presently decides that, for particular applications, polymer mixes must perform beneath a few specific conditions (e.g., mechanical, chemical, warm, electrical) [5]. This presents a major challenge as the materials must regularly work at the restrain of the properties that can be accomplished; subsequently, in-depth thoughts about the properties and execution of polymer mixes are essential.

II. EXPERIMENTAL

Polymer blends are made using a variety of techniques: meltLatex mixing, solution blending, partial block or graft, and combiningfabrication of interpenetrating polymer networks using copolymerization(IPN).A network made up of two or more polymers is known as an IPN form, of which at least one is created and/or cross-linked in thepresence of the other(s) right away.

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The most popular method of blending polymers is through meltingpracticed preparedness. Extruders or batch mixers are used to combine the blend's components while they are still molten.

Polymer mixtures are typically created by solution blendingon an experimental scale. The blend's constituent parts are dissolved in a typicalsolvent while being vigorously agitated. Precipitation separates the mixture from the mixturethe solvent evaporating. The procedure's benefits include quick mixing ofthe system that uses less energy and has the potential toundesirable chemical processes.In recent years, innovative solid state processing techniques, includeCryogenic mechanical alloying or shear pulverization havecreated to facilitate effective polymer blend mixing. The plasticsare pulverized at cryogenic temperatures and on the blendsare achieved [6].

III. RESULTS AND DISCUSSION

In our day to day life polymer blends have become an irreplaceable part.The invention of polymers and polymer blends have made our life much easier. They are used in various fields as is been explicit in Figure 1. The packaging industryitself comprises of about 24% usage and the automotive industry around 16%.The fibers makes up 24% of the total polymer blends used. And the agriculture and horticulture makes up 3% of the total usage.

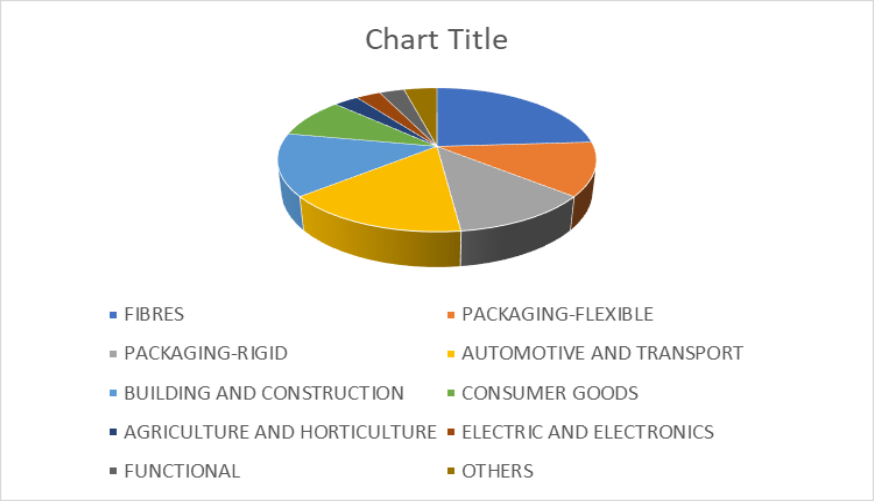

Fig.1 Uses of polymer blends in different sectors

Today's car manufacturers place great emphasis on aesthetics, efficiency and safety when designing cars. The properties sought in materials in the automobile industry are lightness, rigidity, ductility, thermal stability, fame retardancy, and impact resistance.The products obtained from the blends are cost effective. Also this material allow to develop new design of various parts like airbags housing, center stacks in instrument panel and integrated panel pieces The lighter, flexibility and many qualities of them makes them ideal for automotive industry. They are used in exterior parts such as body panels, seals,wheel cover and interior parts such as instrument panel skin and decorative pieces.

The interior, exterior, and under-the-hood components of automobiles all use polymers and polymer blends in some capacity [7]. The development of new materials employing emerging technology should be the primary objective of automakers. In this chapter, specific detailsinformation on various polymers and polymer combinations used in autos is provided. It is also noted that the usage of polymers in a variety of parts, including the exterior, interior, engine, and chassis of the car, will lighten it and improve its fuel efficiency. Future auto-mobile manufacturers will place more emphasis on lightweight materials made from polymer blends.

Polymer blends play a key role in the food packaging industry, where safety, shelf life and durability are paramount. A polymer blend refers to a combination of two or more polymers that are mixed together to create a material with better properties than the individual polymers. In the food packaging sector, these compounds are designed to meet specific requirements such as sealing properties, mechanical strength, flexibility and environmental aspects [8]. Polymer blends allow manufacturers to tailor packaging materials with unique properties. For example, by mixing polymers with different barrier properties, packaging can be designed to protect food from moisture, oxygen and other environmental factors, extending shelf life and maintaining freshness.

Blending different polymers can often result in cost savings. This is particularly important in the food packaging industry, where economies of scale are significant. By using lower-cost polymers with high-performance polymers, manufacturers can achieve

desired properties while controlling costs.Many polymer blends used in food packaging are designed with durability in mind. By adding recycled materials or biodegradable polymers to the mix, the environmental impact of the packaging can be reduced. It meets the demands of consumers for environmentally friendly packaging solutions.Polymer blends can be customized for specific foods. For example, a mixture suitable for packaging snacks may require different properties than a mixture intended for liquids. The ability to adapt the material to the specific needs of the packaged food is a major advantage. The food packaging industry has strict regulations to ensure the safety of packaged products. Polymer blends used in food packaging must comply with these regulations, including regulations on food contact materials and transit restrictions.

Advances in polymer science enable continuous innovation in the field of food packaging. Researchers and manufacturers are constantly looking for new combinations of polymers to create packaging materials that are not only functional but also environmentally friendly. Polymer blends for the food packaging industry enable the creation of materials with better performance, cost-effectiveness and durability [9]. As the demand for safe and environmentally friendly packaging solutions grows, the role of polymer blends in shaping the future of food is likely to increase even more.

IV. CONCLUSION

Polymer blend nanocomposites are versatile materials that offer a synergy of properties for many phenomenal applications. Crystallization in alloys greatly affects the overall properties of the systems. Lower concentration nanofillers replace the primary cores and thus compete with limited crystallization. In addition, higher concentrations of nanofillers result in a retarding effect due to diffusion limitations. Thus, it can be concluded that the addition of nanofiller to polymer blends can significantly affect the crystallization behavior. Depending on the interaction between the filler and the polymer, a new crystal may form in the vicinity of the filler, which may not occur in primary polymer blends. Specifically, in certain cases there are examples of a decrease in the spherulite growth or crystallization temperature of polymer blends in the presence of nanofiller. In addition, as explained in the chapter, nanofillers contribute to heterogeneous nucleation in the polymer system.

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