Processing and Evaluation of Ceramic Filler Reinforced Polymer Matrix Composites

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Abstract. Tensile strength, Young modulus, impact strength, creep resistance, recovery measures, and thermal conductivity are used to evaluate the polymer matrix composite containing ceramic particles as degradation of spongy iron by oxidation to a ferric oxide which is used in steelmaking and low-density polyethylene. The results reveal that the mechanical and thermal properties are affected by the ratio of filler particles (360 µm). Six specimens were prepared and tested in time-dependent conditions at a constant temperature. As a result, increasing the filler ratio added to low-density polyethylene does not accelerate creep with nonlinear viscoelastic behavior. The composite with 0.7 percent ferric oxide particles was found to have the best thermal and mechanical qualities.

1. Introduction

The phrase "filler" can refer to a variety of things, such as fibers or particles. Minerals, metals, ceramics, bio-based materials, gases, liquids, and even other polymers are among the materials that can be employed. Fundamentals that affect filler qualities are known as filler properties. New fibers made of ultra-high molecular weight polyethylene were also introduced, with improved properties. Metals, ceramics, and polymers are all used in these composites. While fillers have a minor effect on mechanical properties, some miners increase stiffness while decreasing strength and elongation. Fillers are usually combined with liquid or molten polymers or applied to adhesive polymers to balance their coefficient of thermal expansion to that of the materials to be joined. The amount of filler, the surface behavior of the filler, and the state of preparation all influence the properties of the filled material. Local variations in mobility and special organization of macromolecular chains can be caused by small particles of a filler inserted into a polymer matrix. Adesina [1] discussed how various wastes can be used to create cementitious composites with improved characteristics. Thermal conductivity can be reduced by using recycled rubber and plastics, according to research. Almtori and et al [2] Because of the increased mechanical qualities, a polyethylene liner with a crosslink hard mulch waste tire was employed; the results suggest that the 85 percent ratio is the best. physical properties of hybrid composites reinforced with fillers are discussed in Matykiewicz [3] study. The epoxy matrix primarily improves the adhesion. Abdul Azam and et al [4] The influence of shell filler on the characteristics of linear polyethylene composites was examined. The characteristics of the composite have also improved as a result of the research. As fillers in composites, the dielectric characteristics of several species were examined. Riquelme and et al [5] The dielectric parameter for pure components and composites increase when polyvinylidene fluoride was used as a filler in ceramics. Durowaye and et al