Patent Search

Invention Title	PROCESS FOR THE PRODUCTION OF NOVEL BIO-BASED HYBRID POLYMERIC COMPOSITES AS ELECTRICAL INSULATOR
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Abstract:

6. ABSTRACT The prime objective of hybridizing DGEBA epoxy resin with bio-based benzoxazine, bi-functional benzoxazine. and bio-silica is to exploit the inherent characteristic (thermal stability, flame retardant behaviour, weather resistance and hydrophobic behaviour) of sustainable bio-materials to replace petroleum based insulating materials for better performance and enhanced longevity. The bio-based benzoxazines has been synthesized using sustainable bio-phenolic precursor material namely cardanol with aniline and formaldehyde through a facile process route in the absence of any solvents and its properties were characterized using modern analytical techniques. The cardanol based mono-functional and bisphenols based bi-functional benzoxazines were synthesized in the present invention have been hybridized with DGEBA epoxy resin reinforced with an appropriate, quantity of 3-glycidoxypropyltrimethoxy functionalized bio-silica derived from rice husk in order to archive lower dielectric constant and thermal conductivity with enhanced breakdown voltage. The properties of hybridized composites namely tensile strength, flexural strength, thermal conductivity, dielectric constant, breakdown voltage were tested by appropriate experimental methods, to assess their suitability towards electrical insulation applications. Data obtained from different studies, it was observed tha the lowest value of dielectric constant of 1.76 and the highest value of break down voltage of 47kV were obtained for" the hybrid composite sample having the composition of C a/BF-afOGEB A/bio- silica (1:1:1:3). Further, the different hybridized bio-composites developed in the present invention possess an enhanced thermal stability, flame retardancy, mechanical strength and improved dielectric behaviour and are found to be suitable for medium voltage electrical insulation application.

Complete Specification

Claims
We claim,
1. The present invention provides a novel process route for the method of production of environmentally friendly, cost competitive, low dielectric, thermally stable, flame retardant and weather resistant bio-composites from renewable bio-source and sustainable agricultural by-products to substitute petroleum based synthetic resins to utilize them for electrical insulation applications. The bio-phenolic precursor namely cardanol derived from cashew-nut shell oil was converted into benzoxazine using aniline with paraformaldehyde through Mannich reaction under solventless experimental conditions. The resulting bio-benzoxazine was hybridized with DGEBA epoxy resin as low polymerization additives and bi-functional benzoxazines as cross linking agents with bio-silica reinforcement derived from sustainable bio-mass of rice-husk to achieve high performance properties suitable for medium voltage electrical insulation applications.
2. The process of claim 1, wherein the enhanced the strength properties namely tensile strength and flexural strength of hybridized bio-composites were achieved using bi-functional cross-linking agents and functionalized reinforcement. The cross-linking agent used are bi-benzoxazines derived from bisphenol-A-aniline (BA-a), bisphenol F-aniline (BF-a). The functionalized reinforcement used is 3-glycidoxypropyltrimethoxy (GPTMS) modified bio-silica. The tensile strength of sample specimen having composition C-a/BA-a/DGEBA/bio-silica (1:1:1:3) was found to be 75 to 85 MPa and the flexural strength of sample specimen having composition C-a/5F-a/pGEBA/bio-silica (1:1:1:3) was found to be 120 to 140 MPa.
3. The process of claim 1, wherein to enhance rate of cure and to lower the cure temperature of benzoxazine based electrical insulation products, an oligomeric additive capable of reacting and forms hybrid materials through chemical bonding. The" preferred oligomeric additive, which lowers the cure temperature of benzoxazines and

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