

Method for recovering fibers from fiber-reinforced polymer (frp) composites waste using microwaves

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ABSTRACT

A method (100) for recycling/recovering of the fibers from fiber reinforced polymer (FRP) composite wastes (102) via microwave may be provided. The method (100) may include cutting and grinding (110) large parts of FRP composite waste (102) to obtain small size waste FRP composite samples (104) and immersing (130) the small sized FRP composite waste samples (104) into the chemical solution (106). Further, the method (100) may include applying 2-step heating phase (140) comprises the step of a first stage heating , idling , and a second stage heating via microwave (108) to obtain completely degraded matrix material (112) and recovered fibers (114) with degraded matrix material residues 15 (116).The 2-step heating phase (140) may restrict charring of the small size FRP composite waste samples (104), increases the temperature of the chemical solution (106) thereby enhancing the reaction rate and facilitates self-separation of fibers during idling.

KEY APPLICATION AREAS

- 1.Orthopedic implants and joint replacement.
- 2.Total ankle replacement (TAR).
- 3.Biomedical prosthetic devices.
- 4.Treatment of ankle arthritis and traumatic injuries.
- 5.Load-bearing implant design and fixation.
- 6.Bone-preserving orthopedic surgery.

POTENTIAL USE

- 1.Total ankle replacement for patients with osteoarthritis, rheumatoid arthritis, post-traumatic arthritis, and severe ankle fractures.
- 2.Restoration of ankle mobility and normal gait by replacing damaged ankle joints with a prosthetic system.
- 3.Improved implant fixation and stability using a concave tibial base plate with anchorage bars or a tapered stem.
- 4.Bone-preserving ankle surgery through reduced bone resection and increased contact with cancellous bone.
- 5.Long-lasting ankle implants with improved load distribution, reduced stress shielding, and minimized bone resorption, enhancing implant lifespan.