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Editorial

Overview about Composite Materials and Its Applications

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Editorial

Composite materials are materials composed of two or more components of significant different chemical or physical characteristics which combined to each other producing another material with new properties defer from the original constituents. The individual components remain separate and distinct within the finished structure. Bio composite is a combination of cement or polymer matrix with organic fibers obtained from agro and forest resources either as a fiber crop or residues [1].

Green composites are a class of bio composites, where a bio-based polymer lattice is strengthened by common strands, and they speak to a developing range in polymer science. New patterns in the choice of regular filaments, that is, from squander instead of from profitable yields were accounted [1].

Concrete is a composite material of coarse granular material (the aggregate of filler) embedded in a hard matrix of material (the cement or binder) that fills the space between the aggregate particles and bonds them together [2].

The composite material has been tested for mechanical properties such as tensile, compressive and bond shear strengths, creep, thermal expansion and hardness. In addition, specimens have been exposed to environments including thermal cycling, gamma and ultra violet radiation, biodegradation from fungi and bacteria and internal and external chemical corrosion followed by mechanical testing [3].

The concept of nanotechnology comprises a range of techniques that allow researchers to probe the behavior of matter. Nanotechnology developments are already essential features and describe a different approach, where the cement paste is combined with carbon nanotubes to produce improved binder properties, including flexural strength and fracture toughness [4].

Improving cement-composite containers using polymer as organic additives was studied extensively. Both unsaturated Styrenated Polyester (SPE) and Polymethyl Methacrylate (PMMA) were used to fill the pores in cement containers that used for disposal of radioactive wastes. Two different techniques were adopted for the addition of organic polymers based on their viscosity. The low density polymethyl methacrylate was added using impregnation technique. On the other hand high density styrenated polyester was mixed with cement paste as a premix process [3].

New developed Japanese invention provides a composite from which concrete featuring a sufficiently high heat resistance can be produced, as well as a high-safety sealed concrete cask having no opening (shielding defect) to offer high shielding performance that can prevent corrosion of an internal canister and release of radioactive material to the exterior. A concrete cask of the invention includes a body with bottom, and cover for opening and closing off a top of the cask. Both the cask body and the lid are made of concrete manufactured by using a composite including Portland cement or blended cement containing Portland cement, which is mixed with water in such a manner that the content of calcium hydroxide falls in a range of 15% to 60% by mass after hardening through hydration reaction. Metallic heat-transfer fins are embedded in the cask body [5].

The use of vegetable fibers as reinforcement in cement-based material is an add/newly developed topic. Application of plant-based natural fibers into cement concrete had also been reported by several Indian institutes. Various plant fibers are used for production of cement, bio-composites e.g. cellulose fiber, lignocellulose waste, sugar can bagasse, wheat and eucalyptus, coconut fiber or shell, waste tea leaves or processed waste tea [2,6].

New trend was started in Egypt studying the contribution of inorganic additive to improve the cement container composite. The gratuity of the mentioned container is as a second barrier following the waste form matrices. This container was candidate for containment of borate waste evaporates simulates and aiming at improving the retardation efficiency of proposed composite to radionuclides release. Inorganic additives namely natural clay, bentonite and kaolin were added to the cement paste before casting. The demolded container is filled with the radioactive borate waste evaporate simulate then closed with lid manufactured from the same composition as the container [3].

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