

Environmentally benign utilization of waste fly ash for industrial construction application

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The dependency of human civilization on electronic items and gadgets is rising at an accelerating pace due to the population explosion. Moreover, to run these electronic items, electricity is a basic necessity that can be provided by thermal power plants, especially in countries like India, which have few nuclear power plants. However, fly ash generated from these thermal power plants has become an alarming concern in recent decades. Researchers and scientists have worked towards upcycling and recycling fly ash strategies. If not appropriately managed, fly ash (FA) could be hazardous and harm human health and the environment. Upcycling of FA from various thermal power plants is still nascent. A considerable increment of 20% to 80% was found in using FA for the last two decades (2000-2020). The current project uses **class F FA** for various industrial construction applications. Construction materials and items such as bricks can be prepared through the use of treated ash/fly ash, blends of waste polyethylene terephthalate (PET), polypropylene (PP) and polyethylene (PE), a toughening agents such as crumb rubber from scraps and selective compatibilizers to collectively tackle the problem of waste plastic management and ash/fly ash from thermal power plants and other industrial sources. A brick made of more than 40 wt.% of FA and a blend of single-use plastics could be the right approach towards society's waste management and FA problem. Before reinforcement, a suitable eco-friendly acidic coating/treatment for FA is required to neutralize or inactivate heavy metals and increase the interfacial adhesion with the optimized blend. Another potential application of the FA could replace the micro/nanofillers in the polymer industry. Suitable treatment and uniform particle size reduction to the micro/nano-level of the FA make them an ideal candidate for hybridizing short fiber reinforced polymer composites.

Keywords: Fly ash; Recycling; Waste management.