

## Applicability of Agro-Waste Materials in the Development of Aluminium Matrix Composites for Transport Structures

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Agro waste materials (AGM) are set of materials from the agricultural stock, whose disposal constitute an environmental burden to the society [1]. Not less than 998 million tonnes of agro wastes are produced on yearly basis, in most cases in the developing world, they are either burnt, dumped somewhere or used as landfilling. These disposal have contributed to the greenhouse gases, climate change, negative impact on human and animals welfare. Growing interest has risen among researchers on the best route to dispose agro wastes in other to avert hazard to the environment [2]. Many suggestions have justified the choice of dumping the agro wastes on land as landfill to be economically viable for them [3]. However, from the waste management point of view, the associated ecological burden such disposal leaves is of utmost concern to environmental researchers. Hence, the choice of recycling the agro-wastes as complimentary reinforcement to synthetic materials in the development of composites for transport structure [4]. By this, the prospect in agro wastes will be well harnessed, especially in the low income countries.

Studies have shown that agro waste derivatives are promising materials for the development of aluminium metal matrix composites (AMCs) on a commercial scale. Due to the market cost of reinforcing materials is expensive in most developing countries, therefore the supplies are also limited. The challenges of high cost and limited supply chain as a result of reliance on importation of conventional ceramic reinforcing materials, especially in developing country,

inform the need to source for alternate route [5]. Therefore, conversion of agro-waste to value-added products is of great appeal to the research and development community, particularly in developing countries where the poor waste management policy and strategies exist. The choice of agro waste as either complimentary reinforcing materials or as a silicon-based refractory material is informed by the high source of silica constituents it posses in its structure [6]. Additionally, other characteristics, such as low cost, large availability, eco-friendly to environment, lower density, makes them highly sort after.

Studies have found that agro-waste materials have been utilized in several ways, such as insulating refractories, fillers for natural and synthetic rubbers, pozzolanic materials, as effluent waste treatment, and as silicon-based refractory compounds source in the design of metal matrix composites [7]. The optimum yield of these silca phases and other refractory compounds are obtained through series of processing protocols. Pre-treatment processing is commonly conducted with the primary aim of removing the volatile constituents inherent in the agro wastes. Other possible means of treatment involves multistep pyrolysis in which a catalyst is used to aid the reaction rate. It was also observed that some researchers prefer to use the agro waste as starting material using a carbothermal processing protocol [8]. The implication of this is that silicon-based refractory compounds form the products obtained in this process. The silicon based refractory compounds are then later used

as reinforcement materials in the development of metal matrix composites with potential application in transport structure. Also, acidic leaching prior to further treatment operations is another route that has gained interest among researchers in the past few decades [9]. This process was necessitated by the need to have a reaction products free from unwanted additives or trace elements from the initial stock of material. Reseachers have noted that this method had proven to be highly effective in removing metallic impurities. In most cases, the surface area is enhanced, although this also depend largely on the type of acid used in the leaching process. It is worthy of mentioning that there may be several drawbacks associated with any of the methods earlier outlined. However, incremental research work is necessary to further position this drawbacks. Utimately, there are future prospect in agro wastes materials.

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