BIODEGRADABILITY STUDY OF PLA/EGG SHELL COMPOSITE IN BURIED SOIL AND OPEN ENVIRONMENT

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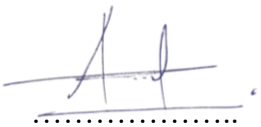
Signed : 

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ABSTRACT

Global awareness of material sustainability has increased the demand for biobased polymers such as poly (lactic acid) (PLA). PLA is seen as a desirable alternative to fossil-based polymers because it has less impact to the environment. PLA is a preferable material used for packaging, mainly for the food since the material is non-toxicity and exhibited desired properties. The rapid growth in the consumption of PLA leads to the generation of huge amounts of residues of PLA, which at present are mostly processed through landfill and composting. Although it has been observed that PLA grades intended for food packaging degrade at a slow rate under ordinary conditions. In addition, high brittleness of PLA has limited it application. To overcome this, addition of appropriate filler in a PLA matrix could enhance the weaknesses of PLA properties. In this work, virgin and recycled PLA blend with natural eggshell (ES) filler to evaluate the biodegradability behaviour of PLA. The virgin and recycled PLA/eggshell composite prepared using solvent casting method. The amount of eggshell filler is varying in the range of 0 wt% to 20wt% in 5wt% incremental. The PLA are dissolved in dichloromethane solution and added with the eggshell filler at various weight percentages. The amount of eggshell filler is in the range of 0 wt% to 20wt% with 5wt% incremental for each composition. The solution is then cast in glass mold and dry at room temperature. The samples are then subjected to two extreme environments; buried in organic soil and open environment under direct sun light. The results show that the maximum tensile strength is observed at the composition of

95wt% VPLA/5wt% ES and declined with further increment of wt% of ES filler. The findings also revealed that virgin and recycled PLA/ES composite exhibited different pattern of degradable behaviour as the wt% of ES filler increases. The degradation rate in buried soil is higher than degradation rate in open environment. Similarly, recycled PLA/eggshell composite have higher degradation rate as compared to virgin PLA/eggshell composite.