

Analysis of Trends and Challenges of Using Renewable Biomass for Bioplastics

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Abstract : The world needs more quality food, shelter and transportation to meet the demands of growing population and improving living standard of those who currently live below the poverty line. Materials are essential commodities for various applications including food and pharmaceutical packaging, building and automobile. Petroleum based plastics are widely used materials amongst others for these applications and their demand is expected to increase. Use of plastics has environment related issues because considerable amount of plastic used worldwide is disposed in landfills, where its resources are wasted, the material takes up valuable space and blights communities. Some countries have been implementing regulations and/or legislations to increase reuse, recycle, renew and remanufacture materials as well as to minimise the use of non-environmentally friendly materials such as petroleum plastics. However, issue of material waste is still a concern in the countries who have low environmental regulations. Development of materials, mostly bioplastics from renewable biomass resources has become popular in the last decade. It is widely believed that the potential for up to 90% substitution of total plastics consumption by bioplastics is technically possible. The global demand for bioplastics is estimated to be approximately six times larger than in 2010. Recently, standard polymers like polyethylene (PE), polypropylene (PP), Polyvinyl Chloride (PVC) or Polyethylene terephthalate (PET), but also high-performance polymers such as polyamides or polyesters have been totally or partially substituted by their renewable equivalents. An example is Polylactide (PLA) being used as a substitute in films and injection moulded products made of petroleum plastics, e.g. PET. The starting raw materials for bio-based materials are usually sugars or starches that are mostly derived from food resources, partially also recycled materials from food or wood processing. The risk in lower food availability by increasing price of basic grains as a result of competition with biomass-based product sectors for feedstock also needs to be considered for the future bioplastic production. Manufacturing of bioplastic materials is often still reliant upon petroleum as an energy and materials source. Life Cycle Assessment (LCA) of bioplastic products has been conducted to determine the sustainability of a production route. However, the accuracy of LCA depends on several factors and needs improvement. Low oil price and high production cost may also limit the technically possible growth of these plastics in the coming years.

Keywords : bioplastics, plastics, renewable resources, biomass

Conference Title : ICMSEM 2016 : International Conference on Materials Science, Engineering and Manufacturing

Conference Location : Singapore, Singapore

Conference Dates : March 03-04, 2016