Biography and Abstract for the 12TH AFRICAN REGIONAL MEETING RCE Conference

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Biography

Mr. Ezra Onyango is research assistant at the Marine Education and Research Center, Ukunda Kenya. Mr. Onyango currently serves as the evaluation and monitoring officer at WSCSD-Kenya, overseeing various marine research, conservation, and education projects. He is the lead researcher of the institution's open-loop recycling of plastic wastes and marine debris project. He has over 4 -years of experience of research in solid waste management, focusing on plastic pollution, marine debris and integration of the sustainable use of marine resources with technical aspects in creating a circular economy. He is a co-developer of the Marine Debris Data Index Mobile App that helps WSCSD-Kenya and its stakeholders to create Story-Maps to showcase the coral reef, plastic pollution, marine ecology, and coral reef maps and geo-referenced data on Sharks, Rays, and Skates collected from the ocean.

Abstract

Background

Plastic recycling is a well-established technology that contributes to a circular economy. New recycling techniques, such as disintegrating plastics in a solvent to purify and preserve its properties of materials, will improve plastic waste management practices. Polymers can also be depolymerized into monomers in solution, which can be used to re - create virgin-grade material. The circularity of plastic is limited by current policies and investments in waste management, detachment, and recycling.

Statement of the Issue

The development of new plastic materials adds complexity to the plastic waste market, which is generally counterproductive to recycling efforts. In the Kenya, recycling failure rates are already rising, with over 12% of post-consumer plastic wastes from industries and households being rejected. Small volume plastics contaminate PET, PE, and PP recycling creeks at the end of their lives, increasing the likelihood that waste will not be recycled due to poor quality.

Solution Suggestion

Solvent extraction allows for the removal of PVC from PET, just as it may be necessary to eliminate PLA from PET waste in the future. Polystyrene recycling has a high potential though the rate of consumer plastic recycling are low due to a lack awareness among stakeholders. Solvent-based approaches to dissolve and densify polystyrene have a potential of making recycling more cost-effective. Limonene and Switchable-polarity are appropriate binary solvent systems that can help dissolve polystyrene. By first dissolving the trash and then adding an extra solvent to selectively precipitate the polymers, solvent-based recycling techniques effectively remove brominated flame retardants from plastics. Higher purity and enhanced sorting are recommended to improve the performance of primary recycling techniques by removing impurities and enhancing beneficial environmental consequences. As a result, optimum recycling performance is achieved when pre-treatment (sorting, cleaning) is tailored to the recycling method.

Study Implications/Future Prospects

The study findings recommend that going forward, appropriate recycling techniques with the lowest environmental impact at a high TRL level will necessitate a transition from the current quaternary and even secondary recycling methods to tertiary recycling approaches, which will have a positive environmental impact and contribute to CO2 reduction. Primary recycling techniques such as the use of solvent works particularly well for high-performance and technical plastics, and should be encouraged. Since primary mechanical recycling solutions are not available for items containing additives, such as WEEE plastics, tertiary recycling to monomers through pyrolysis and gasification are the only option available. This main recycling method will result in enhanced recycling for complex polymers with additives in the distant future, when disintegration is pushed to high TRL levels. Technologies that recover feedstock or wax from polymers may act as a bridge between waste streams

including complicated engineering polymers and thermosets, as well as substantially polluted or mixed streams of waste, and optimum recycling. effect of plastic recycling is anticipated to be lowered further in the future when solvent recycling technique is combined with green power mixtures, since green electricity has fewer environmental consequences than fossil energy sources.

Conclusion

Only by improving pre-treatment in accordance with the most appropriate recycling process for a polymer can the environmental performance of recycling be maximized. The research supports this by demonstrating that polymer quality comprising of mixed source, mixed materials is essential and influences a technology's overall environmental impact; nevertheless, it has no effect on the technology's efficiency score.

Key Words: ***Solvent, recycling, Polymers, depolymerize, PET, PE, and PP recycling Limonene and Switchable-polarity***