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Flexible polyurethane foams based on recycled raw materials

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ABSTRACT

The problem of waste management is highly complex, due to its volume, diverse composition, and properties. It encompasses a wide range of activities related to waste management, from collection to management, and ultimately to economic viability. Plastics recycling technologies aim to reduce the exploitation of natural resources such as crude oil and minimize the environmental impact of plastic waste. The choice of technology is crucial and depends on many factors that influence the costs of a given process. Recycling technologies that utilize waste as a valuable raw material in the production of new products are particularly important.

The plastics industry is striving to transform the economy from a linear —where plastic products are typically subjected to energy recovery or landfill at the end of their lifespan—to a circular economy. In this economic model, plastics remain in circulation for longer periods of time through reuse and recycling.

Our research utilized waste polylactic acid (PLA) to produce flexible polyurethane foams used in the upholstery and furniture industries. Extending the life cycle of PLA is crucial, as it allows for the maximum utilization of this popular material while reducing economic losses resulting from its biodegradable disposal. The aim of the presented research was to use a polyol raw material (eco-polyol) obtained by glycolysis of PLA waste products to produce flexible polyurethane foams. Based on the research characterizing the new polyol raw material, formulations were developed and polyurethane materials were obtained. The dependence between eco-polyol content and the internal structure and physical and mechanical properties of flexible polyurethane foams was also determined.

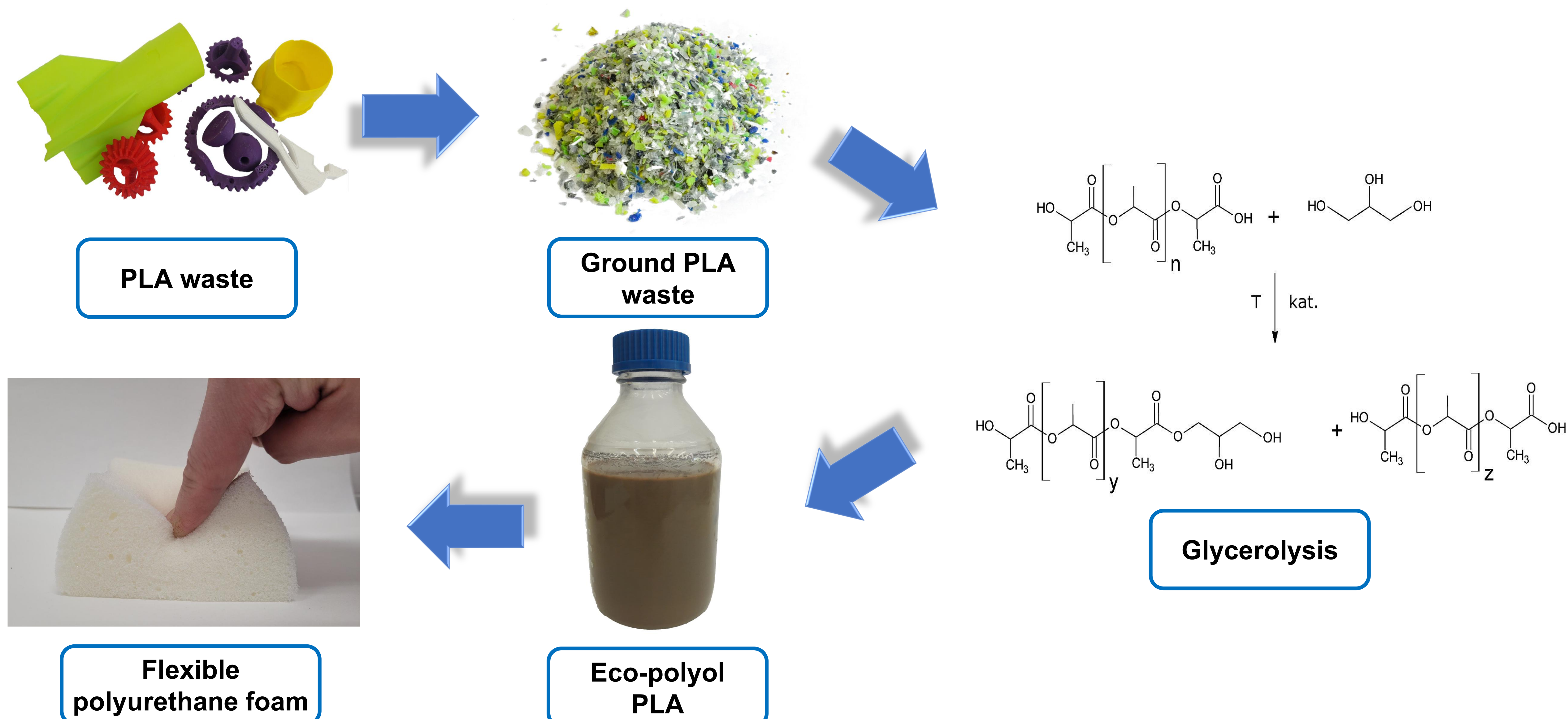
CONCLUSIONS

-The presented method of managing polylactide waste is a simple technology that allows for the "extension of the life cycle" of polylactide that has fallen into disuse, which is fully consistent with the principle of sustainable development and a circular economy.

-The presented method allows the transformation of polylactide waste into full-value polyol products, which were used to synthesize flexible polyurethane foams.

-The eco-polyols obtained from waste polylactide allow for partial elimination of the petrochemical polyol used to obtain flexible polyurethane foams, without impairing their functional properties.

OBJECTIVES



REFERENCES

Joanna Paciorek-Sadowska, Marcin Borowicz, Marek Isbrandt, Łukasz Grzybowski, Bogusław Czupryński, Use of a biodegradable polymer as an alternative raw material for the production of a new eco-polyol. POLIMERY 2020, 65, nr 10.

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