Abstract

1. Abstract Content should be in English
2. The maximum word count should be 250-300 words
3. If your title includes scientific notation, Greek letters, bold, italics, or other special characters/symbols, do make sure they appear correctly.
4. Corresponding details of corresponding author should be correct which will be used for further communication.
5. Abstracts should highlight the major points of your research and should not include tables, figures and references.

Format

Presentation title

: Solid-state polymerization of recycled PET with chain extending modification as a bottle-to-bottle approach

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Presentation type: (Oral presentation)

Abstract (250-300 words):

Polyethylene terephthalate (PET) is one of the most commonly used materials for plastic containers owing to its high tensile strength, high glass transition temperature, and transparency. However, the dramatic increase in PET usage has accelerated plastic waste generation. Disposal of PET waste has been discussed as a main environmental pollution issues. Additionally, approximately 86% of post-consumer plastic products are either landfilled or incinerated annually, resulting in environmental pollution. To overcome the PET waste problems, mechanical recycling is considered an effective recycling method according to global circular economy concept. However, mechanical recycling of PET using extruder is prone to impart the recycled PET (rPET) performance due to reduction in molecular weight (Mw) and intrinsic viscosity (IV). In this study, solid-state polymerization with chain extension (CESSP) of rPET was conducted to enhance the rPET properties. PET flakes were extruded using twin-screw

extruder to prepare rPET. The rPET was first treated using poly (phenyl isocyanate)-co-formaldehyde (pMDI) solution as a chain extender (CE). Subsequently, rPET chips were thermally treated in the SSP reactor at 160 ^{o}C for 0 to 24 hours. IV values of $rPET_{CESSP}$ were determined by IV tester and the chemical structure was investigated by FTIR. And the thermal properties were measured by DSC and TGA. Additionally, $rPET_{CESSP}$ chips were formed into a film to analyze the film properties. Therefore, the mechanical properties, barrier properties, and morphology were measured by universal testing machine, OTR, and XRD respectively. Therefore, CESSP of rPET using pMDI can be versatile method to bottle-to-bottle recycling of rPET.

Biography (150-200 words):

Authors contributed to this work have been supervised by Prof. Jongchul Seo in Food Packaging Materials Lab (FPML). FPML dedicates to investigate chemistry of polymers used for packaging. The core study in FPML is aligned with chemical and physical characterization of functional materials to improve the polymer packaging performance. Recently, FPML has directed massive attentions to enable sustainability in the packaging science via collaborating with industry. simultaneously, we have focused on a practical recycling program in which polymer can be upcycled with the same performance as virgin materials.

Prof. Seo has obtained the chemical engineering with an expertise in chemistry of packaging materials. He has published more than 100 papers in various peer-reviewed journals with a special focus on synthesis of functional materials and chemical characterization.

Jaeyoung Jang graduated in chemical engineering and currently studies as a combined master/Ph.D. student in packaging department. She is a research assistant in FPML, working on polymer recycling and recycling chemistry. She has publised 3 papers in Polymer reviews and Chemical engineering science journal. And she has submitted 1 paper in Trend in food science and technology.

Published

1- Jang, J.; Sadeghi, K.; Seo, J.; Chain-Extending Modification for Value-Added Recycled PET: A Review. *Polym. Rev.* **2022**, Vol. *62*(4), 860. Citation: 33.
2- Jang, J.; Shin, H.; Seo, J.; In-situ chain extension of polyethylene terephthalate flakes using reactive extrusion as an upcycling approach. *Chem. Eng. Sci.* **2023**, Vol. *282*(5), 119289. Citation: 2.
3- Kumar, R.; Sadeghi, K.; Jang, J.; Seo, J.; Mechanical, chemical, and bio-recycling of biodegradable plastics: A review. *Sci. Total Environ.* **2023**, Vol. 882(15), 163446. Citation: 46.