2025
PSK-이녹스 신진연구자 웨비나

2025년 3월 20일(목) PM 15:30 - 17:20 | 온라인 상

https://us02web.zoom.us/j/2776800514?omn=87158700454

주 최 한국고분자학회 **주 관** 에코소재 부문위원회 **후 원** INNOX

초대의 글

'PSK-이녹스 신진연구자 웨비나'는 우수한 연구역량을 가진 신진연구자를 발굴하여 교류의 장을 넓히고자 (주)이녹스의 후원과 한국고분자학회 주최로 마련한 온라인 세미나입니다. 이번 세미나에서는 고분자 분야 중에서도 특히 에코소재를 이용하여 선도연구를 수행하는 신진연구자의 우수한 연구성과를 공유하는 자리를 마련하였으니 관심있는 분들의 많은 참여 부탁드립니다.

일정

PM 15:30 - 16:20	Compatibilization of iPP/PS Blends with Styrene/Butadiene-Derived Block Copolymers Daun Jeong (정다운), djeong@umn.edu Department of Chemical Engineering and Materials Science, University of Minnesota
	ABSTRACT: Mechanical recycling of plastics benefits from block copolymer compatibilizers, yet a limited understanding of their underlying mechanisms hinders the design of optimal polymers for specific blend systems. In this study, we synthesize styrene/butadiene derived block copolymers, poly(styrene)-*block*-poly(ethylene-*ran*-ethylethylene) (SX) diblock and poly(styrene)-*block*-poly(ethylene-*ran*-ethylethylene)-*block*-poly(styrene) (SXS) triblock, via sequential anionic polymerization followed by catalytic hydrogenation, and systematically investigate their effectiveness in compatibilizing semicrystalline isotactic polypropylene (*i*PP)/glassy polystyrene (PS) blends. By tuning the S block molecular weight (10–80 kDa) and block architecture (diblock vs. triblock), we probe the underlying compatibilization mechanisms. Our findings experimentally demonstrate the "threading-the-needle" mechanism previously proposed by our group, and suggest a new mechanism for SX diblock, facilitating plastic deformation of the *i*PP matrix without stress transfer across the phase-separated interface. The *i*PP/PS blends compatibilized with 3 wt% SXS triblocks featuring S block molecular weight higher than 30 kDa achieve competitive ductility (strain at break, $\varepsilon_b > 400\%$) by effective stress transfer from the *i*PP matrix to the PS domain, while shorter S blocks (ca. 10–20 kDa) undergo chain pullout, leading to void formation followed by interfacial failure. Remarkably, incorporating just 0.1 wt% SX diblock also enhances ductility ($\varepsilon_b > 400\%$) by developing thinner interfacial *i*PP amorphous layer and suppressing void formation upon deformation. This study provides critical insights into designing block copolymer compatibilizers and highlights efficacy of SX and SXS copolymers in toughening *i*PP/PS blends.
PM 16:30 - 17:20	Sustainable Strategies for Enhancing the Mechanical Properties of Polylactide: Plasticization and Toughening Approaches Haemin Jeong (정해민), hm9015@krict.re.kr Center for CO_2 & Energy, Korea Research Institute of Chemical Technology (KRICT)
	ABSTRACT: Polylactide (PLA) is a promising biodegradable polymer, but its inherent brittleness ($\varepsilon_b < 10\%$) limits its practical applications. To address this issue, two sustainable strategies were developed to enhance the mechanical properties of PLA. In the plasticization approach, lactide-derived ester oligomers (ALOs) having *double green* properties were synthesized via eco-friendly, solvent-free process. These oligomers were deliberately designed to closely mimic the ester backbone of PLA, ensuring exceptional miscibility. The incorporation of ALOs at 10−50 phr effectively lowered the glass transition temperature (T_g), enhanced flexibility (ε_b = max. 658%), induced elastomeric behavior, and accelerated degradation. In the toughening approach, semicrystalline-glassy multiblock copolymers composed of poly(amide11) (PA11), derived from renewable castor oil, and PLA were synthesized via a mechanochemical process. This approach facilitated the formation of well-defined multiblock copolymers with controlled phase separation, leading to superior mechanical performance. The resulting multiblock copolymers exhibited a balanced combination of high modulus (E = 804 MPa) and yield stress (σ_y = 57 MPa) of PLA, along with remarkable strain-hardening behavior (ε_b = 493%, σ_b = 47 MPa, y = 171 MJ m^{-3}) of PA11, effectively overcoming the brittleness of PLA. These two strategies highlight the potential of sustainable modifications for improving mechanical properties of PLA, paving the way for its broader application in environmentally friendly materials.

한국고분자학회
The Polymer Society of Korea