2025

PSK-이녹스 신진연구자 웨비나

2025년 11월 12일(수) PM 15:00 - 17:00 | 온라인 상

https://us02web.zoom.us/j/88557116278

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 15:00 - 16:00

Enhancing PLA Degradability by Trace Cyclic Anhydride Generating Strong Acid

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ABSTRACT: Polyesters are promising alternatives to all carbon backbone polymers, offering the potential to mitigate extensive plastic accumulation after-use through chemical recycling or biodegradation. As an example, polylactide (PLA) has been widely adopted for commercial applications because of its biorenewable origin from widely available feedstock (e.g., corn), mechanical strength, stiffness, and optical transparency. However, PLA biodegradation requires stringent engineered conditions, such as high temperature (e.g., 55–60 °C) and high humidity, for effective degradation within a timeframe of a few months, persisting much longer under typical environmental conditions. Further enhancements to PLA degradability that are efficient and practical without compromising its many attractive properties are desirable. In this presentation, research will be described that explores PLA containing hydrolysis-accelerating additives that are incorporated into commercial PLA by industrially scalable melt processing. Remarkably, even minimal additive loadings (as low as 0.01wt.%) enable faster complete mass loss below its Tg during hydrolysis, while preserving material properties of PLA.

PM 16:00 - 17:00

Tailored Surface Engineering of Cellulose Nanomaterials for Advanced Polymeric Composites

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ABSTRACT: Nanocellulose is a versatile, bio-based nanomaterial that possesses exceptional mechanical strength, inherently low density, large surface area, and outstanding chemical modifiability, making it attractive for sustainable and high-performance polymer composite applications. In this work, we demonstrate that strategic surface design of cellulose nanocrystals (CNCs) and cellulose nanofibers (CNFs), via targeted grafting chemistry, can dramatically improve interfacial properties and mechanical performance in commercial thermoplastic elastomers (TPE). Specifically, CNCs was hydrophobically grafted with n-tetradecenylsuccinic anhydride (TDSA) using a sequential process involving Pickering emulsion system, lyophilization, and thermal esterification, while CNFs was modified by ionic grafting of amino terminated poly(styrene) (PS). When incorporated into SIS, the TDSA-grafted CNCs enabled a gradual and controllable increase in modulus while maintaining the thermoplastic character and without any compromise of ultimate tensile strength. In contrast, TPE nanocomposites containing PS-grafted CNFs exhibited up to a 10.0-fold increase in modulus and a 3.5-fold increase in tensile strength at 500% strain, even at low filler content (~2 wt %), while still retaining the thermoplasticity of the matrix. These remarkable property enhancements are attributed to strong noncovalent interactions between TDSA groups grafted onto CNCs and the isoprene-rich rubbery phase, as well as between PS-grafted CNFs and the PS hard domains. The underlying mechanisms were further clarified by morphological analysis and theoretical calculations, and these results validate that engineering cellulosic nanofiller surfaces to achieve structural homology with the matrix is a universal and effective approach for optimizing performance in polymeric nanocomposites.