Thin Films from Modified Poly(Glycolic Acid) with Excellent Water Vapor Barrier

Autores

Marieke Hilhorst, Sara Caliari, Lambertus J. Kuijpers, Wouter Post, Fresia Alvarado Chacon

Sinopsis

Commercial biodegradable polymers that combine high oxygen and water vapor barrier properties are scarce. In the packaging industry multilayer materials are usually used to achieve the barrier requirements, however they are usually not recyclable and will not biodegrade when discarded. The outstanding barrier properties of poly(glycolic acid) (PGA) make it an excellent candidate for a biodegradable oxygen and water vapor barrier packaging material. At the same time, its processability into films using standard converting equipment is a major challenge. Low melt strength, high processing temperatures, and fast crystallization at the die limit its use in conventional packaging applications. Chain extenders are typically used to improve the melt strength of polymers and thereby the overall processability, however they may affect the intrinsic barrier properties of the material. This work studied the reactivity of PGA with different chain extenders. It found that by using less than 2% reactive chain extenders the processability of PGA could be highly improved while keeping the intrinsic barrier properties of the material. After compounding PGA with the chain extenders Joncryl and carbodiimide, stable flat sheet extrusion of the material was possible resulting in sheets thinner than 10 µm.



Escanea para ver en línea

E-Book

Año de publicación: 2024

Presentación: PDF (Digital: descarga y online)

2026 © Sistema Integrado de Metadata Estandarizada desarrollado por Hipertexto - Netizen

The multidirectional stretchability of the melt was improved, showing an increase in the melt strength of the polymer. Barrier properties were measured, and it was found that the water vapor transmission rate (WVTR) is not affected by the addition of the chain extender. This improvement in the processability of PGA offers a promising solution for biodegradable high-barrier packaging materials.

MH

Sobre el autor

Marieke Hilhorst

SC

Sara Caliari

LJ

Lambertus J. Kuijpers

WP

Wouter Post

2026 © Sistema Integrado de Metadata Estandarizada desarrollado por Hipertexto - Netizen

FA

Fresia Alvarado Chacon

2026 © Sistema Integrado de Metadata Estandarizada desarrollado por Hipertexto - Netizen