PREPARATION AND CHARACTERIZATION OF POLYMER-BASED BIOCOMPOSITES FOR AGRI-FOOD PACKAGING APPLICATIONS

CORRADO SCIANCALEPORE[1,3*], ELENA TOGLIATTI[1,3], DIEGO PUGLIESE[2,3], ALBERTO GIUBILINI[2,3], MASSIMO MESSORI[2,3], DANIEL MILANESE[1,3]

[1] Dipartimento di Ingegneria e Architettura, Università di Parma, Parco Area delle Scienze 181/A, 43124 Parma, Italia
[2] Dipartimento di Scienza Applicata e Tecnologia, Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, Italia
[3] INSTM, Consorzio Interuniversitario Nazionale di Scienza e Tecnologia dei Materiali, Via G. Giusti 9, 50121, Firenze, Italia

E-mail corresponding author: corrado.sciancalepore@unipr.it

Abstract

The present work aims at the preparation and subsequent mechanical, morphological and thermal characterization of composites based on poly(butylene adipate terephthalate) (PBAT), loaded with micro- particles of inorganic biodegradable phosphate glass (PG)[i] at 2, 4, 10, 20 and 40 wt%.
The reinforcement of PBAT has the purpose of modifying and modulating the mechanical and thermo- mechanical properties of the material to expand its application field especially in the food and agricultural packaging sector[ii], thanks to the similarity of PBAT performance with polyethylene (PE)[iii].
The PBAT-PG specimens were subjected to uniaxial tensile stress and the collected data were analysed to obtain characteristic parameters such as Young's modulus (E), yield stress (σ_y), stress at break (σ_B), elongation at break (ε_B) and toughness (T) (Fig. 1).
Scanning electron microscopy (SEM) images display homogeneous dispersion and distribution of the filler particles in the polymer matrix with no aggregates or phase separation (Fig. 2).
PBAT is considered as one of the most promising biodegradable polyesters and this work demonstrates the successful realization of a PBAT-based composite material, as valid biodegradable and eco-friendly alternative to traditional thermoplastic polymers, such as PE.

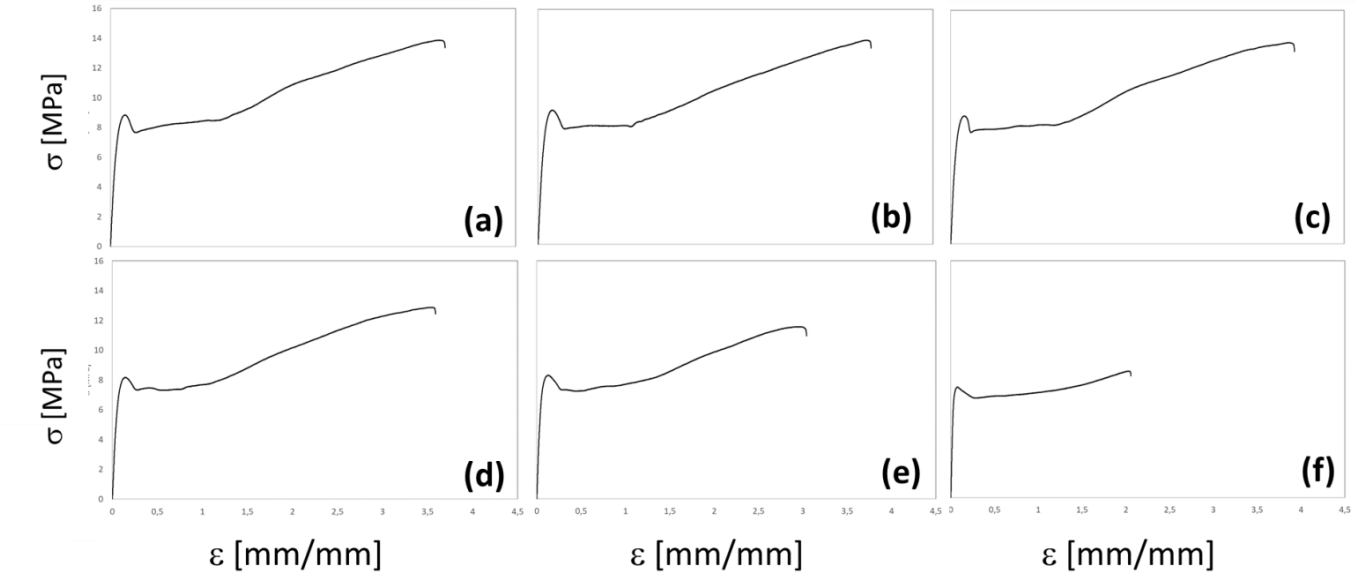

Fig. 1 Tensile curves of PBAT (a), PBAT+2% PG (b) and PBAT+4% PG (c), PBAT+10% PG (d), PBAT+20% PG (e) and PBAT+40% PG (f), respectively.

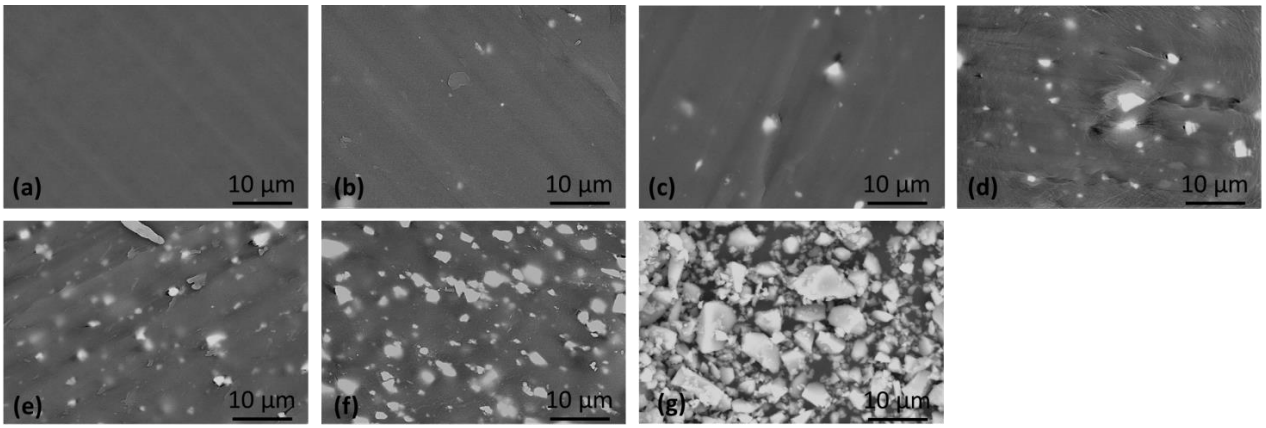

Fig. 2 SEM images of PBAT (a), PBAT + 2% PG (b), PBAT + 4% PG (c), PBAT + 10% PG (d), PBAT + 20% PG (e), PBAT + 40% PG (f) and PG (g), respectively.

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