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Chaloupli et al.

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(54) **BIOBASED ADDITIVE FOR
THERMOPLASTIC POLYESTERS**

(2013.01); *C08K 5/14* (2013.01); *C08K 5/34924* (2013.01); *B29B 2009/125* (2013.01); *B33Y 80/00* (2014.12)

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(58) **Field of Classification Search**

CPC *C08L 67/04*; *B33Y 70/00*; *B33Y 80/00*;
C08K 5/12; *C08K 5/34924*; *C08K 5/0083*; *C08K 5/14*; *B29B 9/12*; *B29B 9/02*

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(c)

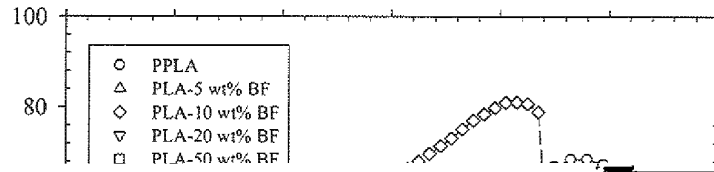


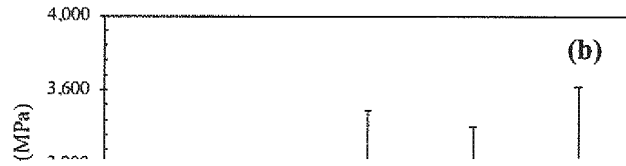


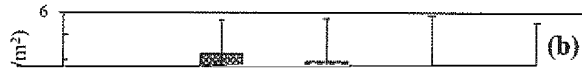


90 95 100 105 110 115 120 125 130
T (°C)

Fig. 4







(b)



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**BIOBASED ADDITIVE FOR
THERMOPLASTIC POLYESTERS**

FIELD

The invention relates to additives for polyesters used to
make, thermoformed injection molded or extruded prod-

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comprising a thermoset biopolyester, wherein the particulate
additive reinforces and nucleates the thermoplastic polyes-
ter. In one embodiment, the thermoplastic polyester is bio-
degradable or bioderived or both. In one embodiment, the
thermoplastic polyester is a non-bioderived polyester. In one
embodiment, the thermoplastic polyester is polyethylene
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99:1, 95:5, 90:10, 80:20, 70:30, 60:40, or 50:50 by weight

In one aspect, a method is provided of making the

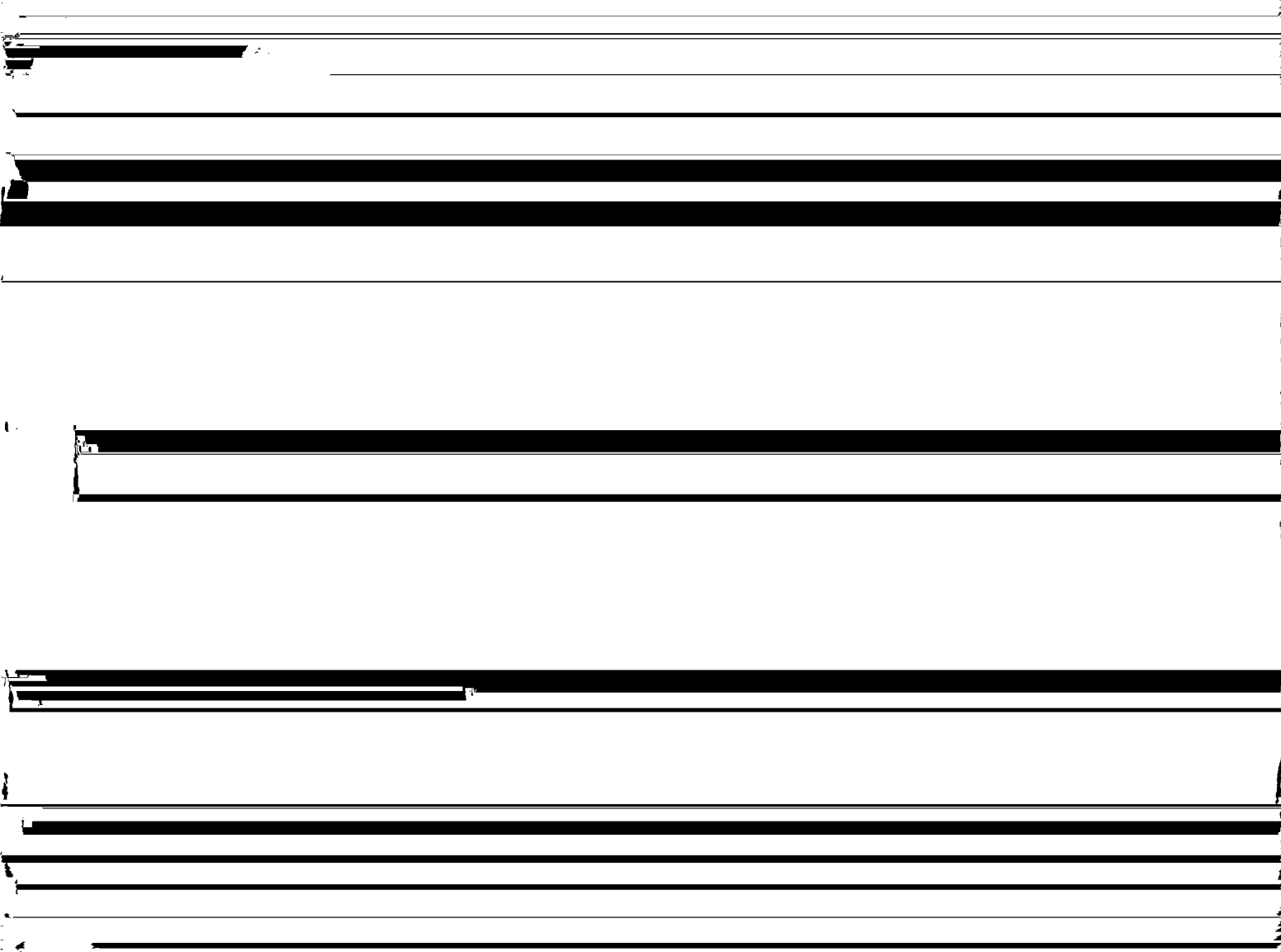
In one embodiment, the mixing is performed in an internal batch mixer. In one embodiment, the grinding is performed

biobased additive of the above aspect, comprising heating biopolyester to a temperature sufficient to (i) melt the biopolyester, and (ii) decompose a selected free radical

embodiment, the method further includes isothermal conditioning between about 80 to about 120° C.

5 initiator, adding 0.5 to 2.5 wt % of the free radical initiator and 0.5 to 2.5 wt % of a crosslinking agent to the biopolyester.

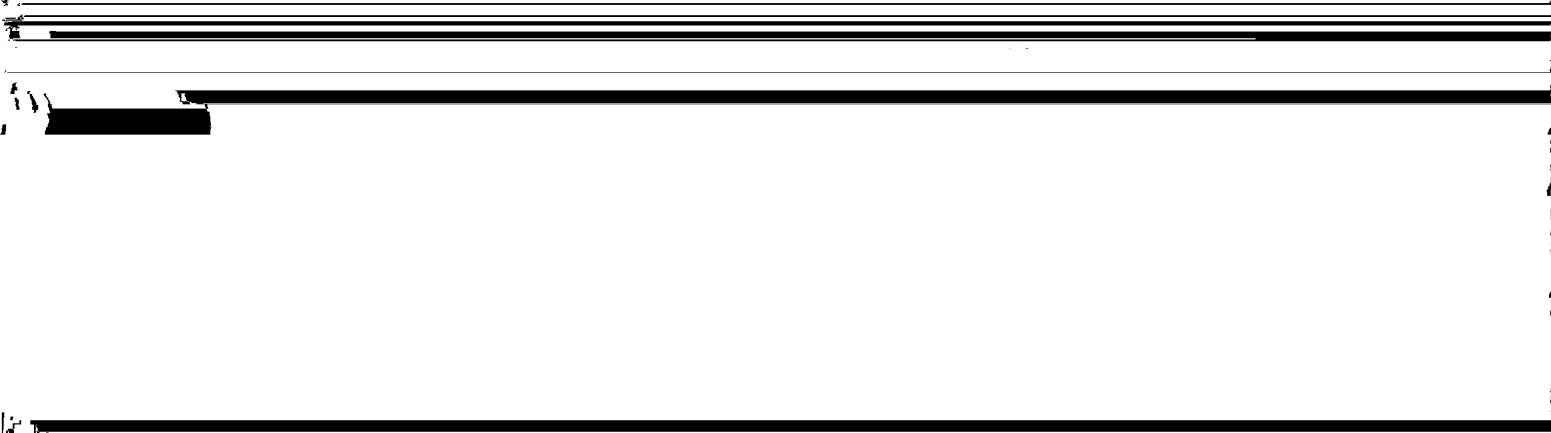
FIG. 6A: Schematic diagram of the structure of the PLA and BF-reinforced PLA composite with specified BF loadings.

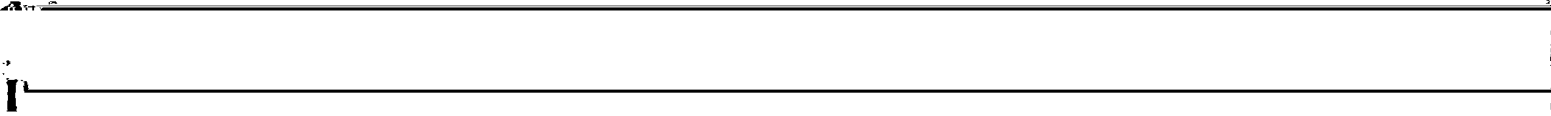
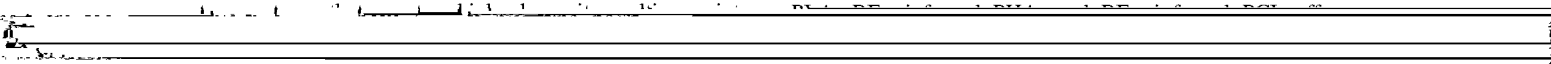
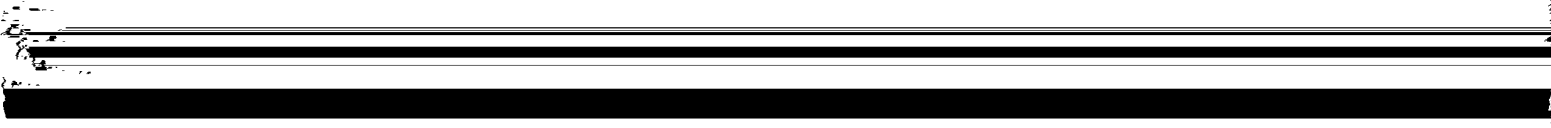


and the free-radical initiator is DCP. In one embodiment, the amount of TAM is about 1 wt % and the amount of DCP is about 1 wt %.

PLA and BF-reinforced PLA composites with specified BF loadings.

FIG. 7A: Schematic diagram of the structure of the PLA and BF-reinforced PLA composite with specified BF loadings.





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Referring to FIG. 2D, a non-isothermal melt crystalliza-

12

Referring to FIG. 9A, a graph is shown of the particle size

13

using the laboratory internal mixer (Haake) for 5 min under

14

respectively. The samples were molded at 190° C. and were

The melt mixing of PBR with 5 wt % of RE was carried out in a laboratory internal mixer. The samples

and increased the crystallization rate. The crystallization rate

Gel permeation chromatography (GPC) was performed

is, first, controlled by nucleation and then crystal growth and

using a Viscotek 270 max separation module equipped with

to an enhancement of the density of nuclei, increasing the crystallization rate at the early stage of crystallization.

(IV), and light scattering (low angle, LALS and right angle, RALS). The separation module was maintained at 40° C.

