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(71) Applicant (for all designated States except US): **E. I. DU PONT DE NEMOURS AND COMPANY** [US/US]; 1007 Market Street, Wilmington, DE 19898 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SMILLIE, Benjamin, Andrew** [CA/CA]; 21 Montgomery Boulevard, Kingston, Ontario K7M 3N7 (CA). **URADNISHECK, Julius** [US/US]; 84C Creek Road, Glen Mills, PA 19342 (US).

(74) Agent: **SHAY, Lucas, K.**; E. I. Du Pont De Nemours and Company, Legal Patent Records Center, 4417 Lancaster Pike, Wilmington, DE 19805 (US).

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14 August 2008

(54) Title: TOUGHENED POLY(HYDROXYALKANOIC ACID) COMPOSITIONS

(57) Abstract: Disclosed is a toughened poly(hydroxyalkanoic acid) resin composition comprising poly(hydroxyalkanoic acid) and an impact modifier comprising a core/shell polymer that does not comprise a vinyl aromatic comonomer, having a refractive index not greater than 1.5; wherein the core comprises elastomer and the shell comprises non-elastomeric polymer. Also disclosed are packaging materials and packaged products comprising the composition.



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## INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/020341

## A. CLASSIFICATION OF SUBJECT MATTER

INV. C08L67/  $\oplus$  B65D81/0  $\ominus$ 

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C08L B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal , WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
Y	DATABASE WPI Week 200648 Thomson Scientific, London, GB; AN 2006-472264 XP002464076 -& WO 2006/064846 A (KANEKA CORP) 22 June 2006 (2006-06-22) abstract	1-10
P, Y	-& EP 1 826 241 A (KANEKAFUCHI CHEMICAL IND [JP]) 29 August 2007 (2007-08-29) paragraph [0071] - paragraph [0072] paragraph [0085] - paragraph [0086] examples 7-9 claims 1,3  ----- -/--	1-10



Further documents are listed in the continuation of Box C



See patent family annex

## Special categories of cited documents

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

24 January 2008

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19.06.08

Name and mailing address of the ISA/

European Patent Office, P B 581 8 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel (+31-70) 340-2040, Tx 31 651 epo nl,  
Fax (+31-70) 340-3016

Authorized officer

Kaul -Buchberger, Eva

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US20 07/020341

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☒ claims Nos.: 2-10 (partly)  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:  
**see FURTHER INFORMATION sheet PCT/ISA/210**
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.
  
2. ☒ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
  
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**1, 2 - 10 ( partly)**

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/210

Continuation of Box 11.2

Claims Nos.: 2-10 (partly)

There exists an inconsistency between claims 1 and 2 (and the corresponding parts of claims 3-11) for the following reason: claim 1 is directed to a composition comprising or produced from 90-99.8 wt.% of a poly(hydroxyalkanoic acid) composition and 0.2-10 wt.% of an impact modifier, based on the total weight of poly(hydroxyalkanoic acid) and the modifier, wherein the poly(hydroxyalkanoic acid) comprises repeat units derived from 6-hydroxyhexanoic acid, 3-hydroxyhexanoic acid, 4-hydroxyhexanoic acid, 3-hydroxyheptanoic acid, or combinations thereof; the modifier comprises a core/shell polymer that does not comprise a vinyl aromatic comonomer and has a refractive index not greater than 1.5; and the core comprises elastomer and the shell comprises non-elastomeric polymer, whereas claim 2 is directed to the composition of claim 1, but wherein the poly(hydroxyalkanoic acid) comprises repeat units derived from hydroxyalkanoic acids having five or fewer carbon atoms (especially, polylactic acid as used in all examples). Therefore, it is unclear what is claimed by the application, contrary to Article 6 PCT and, thus, the search is restricted to the subject-matter of claim 1 and that parts of claims 2-11, which correspond to claim 1.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) PCT declaration be overcome.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

**This International Searching Authority** found **multiple** (groups of) inventions **in this** international application, **as follows**:

## 1. claims : 1,2-10(partly)

Claim 1 is directed to a composition comprising or produced from 90-99.8 wt.% of a poly(hydroxyal kanoic acid) composition and 0.2-10 wt.% of an impact modifier, based on the total weight of poly(hydroxyal kanoic acid) and the modifier, wherein the poly(hydroxyal kanoic acid) comprises repeat units derived from 6-hydroxyhexanoic acid, 3-hydroxyhexanoic acid, 4-hydroxyhexanoic acid, 3-hydroxyheptanoic acid, or combinations thereof; the modifier comprises a core/shell polymer that does not comprise a vinyl aromatic comonomer and has a refractive index not greater than 1.5; and the core comprises elastomer and the shell comprises non-elastomeric polymer.

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## 2. claims : 2-10(partly)

Claim 2 is directed to the composition of claim 1, but wherein the poly(hydroxyal kanoic acid) comprises repeat units derived from hydroxyal kanoic acids having five or fewer carbon atoms (especially, polylactic acid as used in all examples). Therefore, it is unclear what is claimed by the application, contrary to Article 84 EPC and, thus, the search is restricted to the subject-matter of claim 1 and that parts of claims 2-11, which correspond to claim 1.

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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2007/020341

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
Y	<p>DATABASE WPI Week 200607 Thomson Scientific, London, GB; AN 2006-067478 XP002464077 - &amp; WO 2005/123831 A (UNITIKA LTD) 29 December 2005 (2005-12-29) abstract</p>	1-10
P, Y	<p>- &amp; EP 1 785 453 A (UNITIKA LTD [JP]) 16 May 2007 (2007-05-16) paragraph [0009] paragraph [0013] - paragraph [0014] table 1 examples 5,6</p>	1-10
Y	<p>----- EP 1 657 280 A (TOSOH CORP [JP]) 17 May 2006 (2006-05-17) paragraph [0013]- example 1 claim 1 -----</p>	1-6

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/020341

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
WO	2006064846	A	22-06-2006	EP	1826241	A1	29-08-2007
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				US	2006106162	A1	18-05-2006