(54) Title: IMPROVED POLYMERIC COMPOSITE INCLUDING NANOPARTICLE FILLER

(57) Abstract: Disclosed is a novel polymeric composite including a nanoparticle filler and method for the production thereof. More particularly, the present invention provides a novel halloysite nanoparticle filler which has the generally cylindrical or tubular (e.g., rolled scroll-like shape), in which the mean outer diameter of the filler particle is typically less than about 500 nm. The filler is effectively employed in a polymer composite in which the advantages of the tubular nanoparticle filler are provided (e.g., reinforcement, flame retardant, chemical agent elution, etc.) with improved or equivalent mechanical performance of the composite (e.g., strength and ductility).
Declarations under Rule 4.17:
— as to the identity of the inventor (Rule 4.17(i))
— as to applicant’s entitlement to apply for and be granted a patent (Rule 4.17(U))
— as to the applicant’s entitlement to claim the priority of the earlier application (Rule 4.17(Ui))

Published:
— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

Date of publication of the international search report:
12 June 2008
INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 06/34281

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) ... lpdesk: 571-272-4300
Facsimile No. 571-273-3201 PCTOSP 571-272-7774

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
USPC: 524/445, 847, 977/778

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

Electronic database consulted during the international search (name of data base and, where practicable, search terms used)
Electronic Databases Searched: USPTO WEST (EPAB, JPAB, USPT, PGPUB), Google Scholar, Google patent. Search Terms Used: PNP, nanotube, halloysite, thermost$, clay or halloysite, polymeric adj nanoparticle, blow or extrusion or foam, coloran$ or antioxidants or emulsifiers or biocides or pesticides or dyes, imogolite

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 2005/0171265 A1 (Botnick et al.) 04 August 2005 (04.08.2005) entire document especially para [0001]; [0002]; [0005]; [0010]; [0016]; [0017]; [0020]; [0022]; [0026]; [0027]-[0028]; [0035]; [0036]; [0038]; [0040].</td>
<td>1-77</td>
</tr>
<tr>
<td>Y</td>
<td>US 6,822,032 B2 (Gaullucci) 23 November 2004 (23.11.2004) especially col 8, in 51-56</td>
<td>32 and 61</td>
</tr>
</tbody>
</table>

D Further documents are listed in the continuation of Box C.

D

"A" 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 application or patent 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

Date of the actual completion of the international search
04 February 2008 (04.02.2008)

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