



(51) International Patent Classification:
C08K 11/00 (2006.01)

(21) International Application Number:
PCT/EP2019/073032

(22) International Filing Date:
29 August 2019 (29.08.2019)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2018/13944 26 September 2018 (26.09.2018) TR

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,

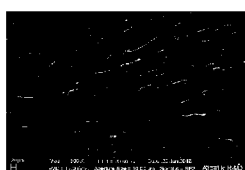
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

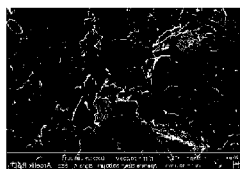
Published:
— with international search report (Art. 21(3))

(54) Title: POLYMER COMPOSITE

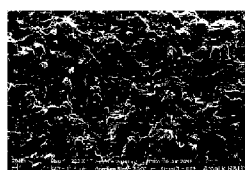
Figure 1



A



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(57) Abstract: The present invention relates to a polymer composite produced to be used in white goods and to the production method thereof.



Description**POLYMER COMPOSITE**

- [0001] The present invention relates to a polymer composite, to the production method thereof and the use thereof in white goods.
- [0002] In countries under Mediterranean climate, the amount of waste olive stones, which are called dry olive pomace, obtained as a result of the production of olives, olive oil and other olive products, reaching a very high tonnage and said stones being using only as fuel but not being recycled poses a serious problem.
- [0003] In the state of the Chinese Patent No. CN 102492198 B, the preparation method of an eco-friendly polyolefin composite material is disclosed. In the production of composites, waste nut and walnut shells are made compatible with a polymer and then extruded.
- [0004] The state of the art International Patent Application No. WO 2002/014432 A1 relates to the use of fruit stone powder in the Polyvinyl chloride (PVC) matrix which is a thermoplastic matrix, and to the goods obtained in this manner.
- [0005] The aim of the present invention is the use of polymeric composite, which is obtained by adding olive stone (dry olive pomace) powder into thermoplastic materials, in white goods applications.
- [0006] The polymeric composite realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof comprises a thermoplastic material, a desiccant, a compatibilizer, olive stone (olive pomace) powder and, optionally, mineral additive and/or fibrous additive.
- [0007] The polymer composite of the present invention can be used in white goods such as laundry washing machine, laundry drying machine, dishwasher, refrigerator, air conditioner, curling iron, hair straightener, water purifier, coffee machine, tea machine, air purifier, oven, cooker, kettle, etc.
- [0008] The polymeric composite realized in order to attain the aim of the present invention is illustrated in the attached figures, where:
Figure 1: is the scanning electron microscope view of the composite

comprising A) Additive-free polypropylene (PP), B) PP + 10% Olive Stone Powder, C) PP + 40% Olive Stone Powder.

- [0009] The polymeric composite of the present invention comprises a desiccant, a thermoplastic material, a compatibilizer and, optionally, mineral additive and/or fibrous additive.
- [0010] The desiccant retains the potential moisture from the olive stones. Thus, the risk of the moisture damaging the material during the process is prevented. Maleic anhydride-grafted polypropylene compatibilize the hydrophilic olive stone powder and the hydrophilic polypropylene, thus improving the physical and mechanical properties of the materials. Moreover, by means of said material, the olive stone powder is coated with polypropylene, thus preventing the material from getting humid.
- [0011] The polymeric composite of the present invention comprises olive stone (dry olive pomace) powder.
- [0012] The olive stone material is added to a thermoplastic material and used in the production of the polymeric composite of the present invention in particular for satisfying the need for materials with high mechanical strength and providing alternatives for wooden-like parts. In the polypropylene matrix, with the addition of the olive stone powder and maleic anhydride-grafted polypropylene (MA-g-PP), the lightness advantage of the thermoplastic material is maintained while the values of Young modulus, E modulus and bend strength are significantly improved. Thus, white goods comprising recycled, environmentally-friendly polymer composite with improved mechanical properties and suitable for industrial use can be produced.
- [0013] By means of the present invention, waste olive stone (dry olive pomace) powder is used in plastics, thus producing environmentally-friendly plastic composites. By means of the developed material, waste materials are used in an innovative manner and environmentally-friendly plastic composites having fewer petroleum-based raw materials are produced. Moreover, cost advantage is provided by using dry olive pomace, which is very cheaper than polypropylene, in plastic composites. The added powder olive pomace gives the plastics a wooden-like appearance. Thus,

the material can be used as a decorative component in plastic parts which are desired to have wooden-like appearance.

[0014] **Table 1. Mechanical properties of polymer composite samples.**

[0015]

Table 1
Polymer Composite Samples

Material Properties	Additive-free PP	Formulation 1 + 10% Olive Stone Powder	Formulation 2 + 40% Olive Stone Powder
Density, g/cm³	0.9	0.9	1.0
Tensile strength at yield (MPa)	29	30	29
Elongation at yield (%)	10	5.1	2.5
Young Modulus (MPa)	1450	1859	2607
Izod Impact Strength (kJ/m²)	3.6	3.7	2.3
Bend Strength (MPa)	36	41	38
E Modulus (MPa)	1190	1524	2162

[0016] In the preferred embodiment of the present invention, the polymeric composite comprises maleic anhydride-grafted polypropylene (MA-g-PP) as compatibilizer.

[0017] In an embodiment of the present invention, the polymeric composite comprises 56-86% thermoplastic material, 1.5% desiccant granules, 2.5% maleic anhydride-grafted polypropylene (MA-g-PP) and 10-40% olive stone (dry olive pomace) powder, and, optionally, mineral additive and/or fibrous additive.

[0018] As the percentage of the olive stone powder increases, the material costs decrease while the values of Young modulus and E modulus increase.

Moreover, by decreasing the use of plastic raw materials, the material gets more environmentally-friendly. However, high percentages of olive stone causes the values of elongation at yield and impact strength to decrease. Therefore, the amount of olive stone powder can be increased/decreased depending on the application area.

- [0019] The polymer composite production method of the present invention comprises the steps of
- granulating by means of crusher knives and blender the olive stones (olive pomace) which are waste products of the olive oil production process,
 - adjusting the temperature of the extruder according to the melting temperature of the polypropylene (PP) matrix,
 - feeding the polypropylene (PP) matrix and the maleic anhydride-grafted polypropylene (MA-g-PP), which are homogeneously mixed, into the extruder via the main feeder of the extruder so as to melt the same, and then adding the powdered olive stones into the system via the side feeder of the extruder to be mixed with the polymer matrix so as to obtain the polymeric composite melt,
 - cooling down the mixture extruded from the extruder as molten filament in a water bath, and afterwards granulating the same by means of crusher knives,
 - forming the obtained polymer composite granules by means of injection molding method.

[0020] By using the olive stone powder in the polymeric composite of the present invention, the lightness of the polypropylene material is maintained while the rigidity thereof is increased, moreover providing cost advantage. Furthermore, the amount of petroleum-based raw materials used is minimized, the waste olive stones are made use of in the product, and environmentally-friendly polymeric composites with improved mechanical properties are obtained. In addition, thanks to the wooden-like appearance thereof, the polymeric composite of the present invention can be used in decorative parts designed with a wooden-like appearance. With the hydrophobic properties, chemical strength, high elasticity and mechanical

properties of the polypropylene, said polymeric composite gains improved properties with respect to wood as well as having a wooden-like appearance.

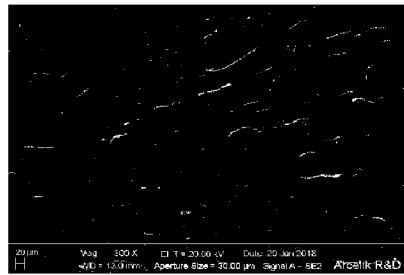
- [0021] In an embodiment of the present invention, the polymer composite of the present invention is used in white goods.
- [0022] In an embodiment of the present invention, the polymer composite of the present invention is used in a laundry washing machine.
- [0023] In an embodiment of the present invention, the polymer composite of the present invention is used in a laundry drying machine.
- [0024] In an embodiment of the present invention, the polymer composite of the present invention is used in a dishwasher.
- [0025] In an embodiment of the present invention, the polymer composite of the present invention is used in electrical home appliances.
- [0026] In an embodiment of the present invention, the polymer composite of the present invention is used in an air conditioner.
- [0027] In an embodiment of the present invention, the polymer composite of the present invention is used in a refrigerator.
- [0028] In an embodiment of the present invention, the polymer composite of the present invention is used in a hair dryer.
- [0029] In an embodiment of the present invention, the polymer composite of the present invention is used in a curling iron.
- [0030] In an embodiment of the present invention, the polymer composite of the present invention is used in a hair straightener.
- [0031] In an embodiment of the present invention, the polymer composite of the present invention is used in a water purifier.
- [0032] In an embodiment of the present invention, the polymer composite of the present invention is used in a coffee/tea machine.
- [0033] In an embodiment of the present invention, the polymer composite of the present invention is used in an oven.
- [0034] In an embodiment of the present invention, the polymer composite of the present invention is used in a cooker.
- [0035] In an embodiment of the present invention, the polymer composite of the present invention is used in an air purifier.

Claims

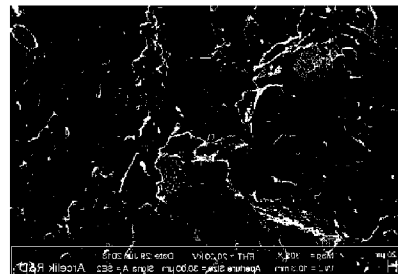
1. A polymeric composite **comprising** a desiccant, a compatibilizer and, optionally, mineral additive and/or fibrous additive, **characterized by** comprising olive stone (dry olive pomace) powder.
2. A polymeric composite **characterized in that** the compatibilizer is maleic anhydride-grafted polypropylene (MA-g-PP).
3. A polymeric composite as in Claim 1, **characterized by** comprising 56-86% thermoplastic material, 1.5% desiccant granules, 2.5% maleic anhydride-grafted polypropylene (MA-g-PP) compatibilizer and 10-40% olive stone (dry olive pomace) powder, and, optionally, mineral additive and/or fibrous additive.
4. A polymer composite production method **characterized by** comprising the steps of
 - granulating by means of crusher knives and blender the olive stones (olive pomace) which are waste products of the olive oil production process,
 - adjusting the temperature of the extruder according to the melting temperature of the polypropylene (PP) matrix,
 - feeding the polypropylene (PP) matrix and the maleic anhydride-grafted polypropylene (MA-g-PP), which are homogeneously mixed, into the extruder via the main feeder of the extruder so as to melt the same, and then adding the powdered olive stones into the system via the side feeder of the extruder to be mixed with the polymer matrix so as to obtain the polymeric composite melt,
 - cooling down the mixture extruded from the extruder as molten filament in a water bath, and afterwards granulating the same by means of crusher knives,
 - forming the obtained polymer composite granules by means of injection molding method.
5. A white good **characterized by** comprising a polymer composite as in Claim 1.
6. A laundry washing machine **characterized by** comprising a polymer composite as in Claim 1.
7. A laundry drying machine **characterized by** comprising a polymer composite as in Claim 1.
8. A dishwasher **characterized by** comprising a polymer composite as in Claim 1.
9. A refrigerator **characterized by** comprising a polymer composite as in Claim 1.

10. An electrical home appliance **characterized by** comprising a polymer composite as in Claim 1.
11. An air conditioner or air purifier **characterized by** comprising a polymer composite as in Claim 1.
12. An oven or cooker **characterized by** comprising a polymer composite as in Claim 1.
13. A hair dryer or hair straightener or curling iron **characterized by** comprising a polymer composite as in Claim 1.
14. A water purifier **characterized by** comprising a polymer composite as in Claim 1.
15. A coffee/tea machine **characterized by** comprising a polymer composite as in Claim 1.

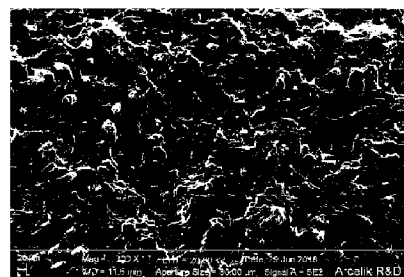
Figure 1



A



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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/073032

A. CLASSIFICATION OF SUBJECT MATTER
 INV. C08K11/00
 ADD.
 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)
 C08K C08L

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 practicable, search terms used)
 EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NADIR AYRILMIS ET AL: "Utilization of olive mill sludge in manufacture of lignocellulosic/polypropylene composite", JOURNAL OF MATERIALS SCIENCE, KLUWER ACADEMIC PUBLISHERS, BO, vol. 45, no. 5, 9 December 2009 (2009-12-09), pages 1336-1342, XP019770495, ISSN: 1573-4803 examples 4,6,8,10 -----	1-15

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

25 September 2019

Date of mailing of the international search report

09/10/2019

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