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(54) Title: AN APRICOT SEED BASED COMPOSITE MATERIAL AND RELATED PRODUCTION METHOD

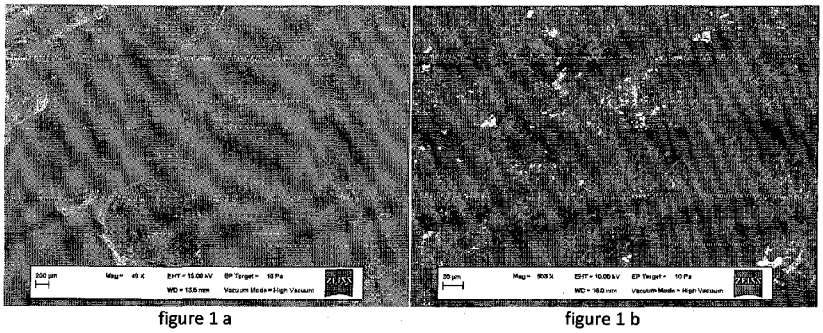


figure 1 a figure 1 b

(57) Abstract: The invention is related to a composite material that can be processed alike in machine, furniture, construction, aviation, space and defense industry as a base material to be used in light and high mechanic durability elements and parts.

WO 2014/149014 A1

AN APRICOT SEED BASED COMPOSITE MATERIAL AND RELATED PRODUCTION METHOD

Description

Technical Properties

The invention is related to a composite material that can be processed alike in machine, furniture, construction, aviation, space and defense industry as a base material to be used in light and high mechanic durability elements and parts.

For making clearer, invention is related to a material which the main matrix is made from crushed apricot seed skin, and acquiring a composite material by mixture of suitable type and amount of epoxy resin, and material's production method. The said material along with its high mechanical durability, has a very high heat and electrical insulator, and easily producible and machinable properties along with production of required several materials, makes it a good armor production material.

State of the Art

The definition of the composite material within the state of the art: produced with two or more material and provides properties that cannot be achieved with one material. With composites light, durable, elastic and high temperature resistant materials can be produced. The material's lightness, durability, processability, insulating, resistance to high temperature etc properties are achieved with produced composite materials. Chemical and physical properties can be gained to composite materials based on area of utilization. Based on the area of utilization the suitable composite material is produced according to the determined property of material. For example if insulating property is needed polymer main matrix is employed. If both insulating and durable material is required ceramic based matrix composite is used. For high temperature resistance cast iron is used, for high temperature and abrasion resistance steel is used.

The most known composite materials are cement and mortar in construction, fiber-strengthen polymer in reinforced plastic, metal composites and ceramic composites. They are in general commonly used in structures alike construction, bridge and ship body, race car body, bath tubes, marble bench, storing tanks. The most advanced samples; are seen in aviation and space industry due to their corrosion resistant, light weight and high physical and chemical durability. Particularly in space and aviation the reinforced plastic and varieties and when needed the achieving physical properties with metal alloys, products more durable than steel along with light weight is obtained. Light wings for plane and shuttles, rocket protectants, body and frame can be produced with shaping of these composites according to required shape in suitable molds with various polyester and fillings.

While achieving these composite styles, different structure development is ensured with contents of plastic and derivatives with carbon and its alloys. When required, adding certain amount of various metals, changing of the durability, hardness and other physical properties are obtained. For example in defined patent application below, the supporting of various physical properties of composite formed after inclusion of crushed fruit skin, seed or seed skin is mentioned.

Moreover, it is seen that composite materials produced with attention to their physical and chemical properties are intensively used in industry.

In EP0292628 European Patent, a mixture similar to synthetic wood or marble is defined. The said mixture is composed of fruit root or skin or marble fragments, binder material and suitable ingredients for different purposes. The method for the production of the mixture comprises the cleaning, crushing, mixing and molding of the reactive material. In said document, no approach is observed related to apricot seed but focused on olive seed. The product is aimed to provide hard floor instead of artificial marble or stone.

In US2319182 USA patent the molded material is defined. More clearly, moldable vegetable like materials were mentioned. The inventor discovered that hazelnut skin, various tree barks and different seed and grains has thermoplastic properties. It is mentioned that they can be individually or along with other thermoplastic materials alike natural or artificial resins used as a fundamental base material. The molded material hardness, strength, wearing off, abrasive effect, resistance and other physical properties can be used with other changing agents. Here only thermoplastic properties were focused and only hazelnut skin was preferred.

WO201001394 International patent application, for using in construction, furniture etc industry, fiber-fragmented plate containing fibrous and porous fruit skin and suitable binder that were made from agricultural waste products was mentioned. Fibrous materials, porous materials and binder are mixed, cold pressed for suitable thickness and hot pressed for bind development and cooled before usage.

In JP62032142 patent application, a composite resin mixture and its modified pellet with good mechanical properties alike transparent, softness and brightness, use of a material which is injected to a cellulosic material with modified a chemical change, in furniture and construction component was mentioned. As an example to cellulose material, cellulose fibers, lignocellulose fibers, wood pulp, waste paper and fruit seed powder. As a modified polyefin, malak anhydrite-modified polypropylene were preferred. AN example to chemical modification is esterification, etherification and halogenation.

However, in none of the above defined solutions particularly the structure of a product formed by crushing of apricot seed mixing with appropriate resins and provided advantageous of the product were not mentioned.

The Aim of the Invention and Brief Description

The aim of the invention is to produce a composite material with durable, insulating, resistant to corrosion, high adhesive abrasion resistant, low density and machinable properties.

The other aim of the invention is since it is suitable to machined or unmachined production due to its high physical resistance, light weight and other physical advantages, to produce composite material that can be used in required industrial areas from aviation to space, construction to machinery, furniture to automotive and energy to electricity due to its properties.

The aim of the invention is to produce apricot based composite material.

The other aim of the invention is to obtain products in desirable size and physical properties of the mixture of apricot seed skin based composite material mixed with appropriate amounts of different resin and elements.

Another aim of the invention is to produce lightweight bulletproof chest and/or armor production from apricot seed skin based composite material.

The aim of the invention is to offer a method for producing a composite material from apricot seed skin revealing superior physical property.

Another aim of the invention is to produce a method for manufacturing light but highly durable and abrasion resistant products alike bulletproof chest, armor, insulator from composite material made from apricot seed skin.

Brief Description of Figures

In Figure 1a bulk product polished composite material obtained from the invention subject of apricot seed skin and in Figure 1b abraded surface view is given

In Figure 2 the graphic of abrasion test employed on bulk product of composite material made from apricot seed skin is given

THE DETAILED DEFINITION OF THE INVENTION

The invention is a production method of producing organic ingredient composite material significantly light and electrically insulated along with known properties of any metal containing composite.

The invention's main matrix is obtained by crushing apricot seed skin. The crushed apricot seed skin is classified according to grain sizes by sieving. The size-wise classified apricot seed skin were jointed with mixing epoxy binders. The amount of used epoxy binder is precisely added according to the classified apricot seed skin's weight percentage. The obtained composite material when compared to other metal containing composite materials; has lower bulk density, has better mechanic durability, temperature and electrical insulation is in usable limits, corrosion resistance value is usable, no raw material shortages, low cost, machined or unmachined production than several materials and can form a basis structure for obtaining products that can be used armor material in defense industry.

The apricot seed skin has a property of hard low weight, insulated, resistant to corrosion and abrasion, high mechanic durability. Due to these specifications, a composite material is produced that can be used for the products to be employed in aviation, space, construction, machinery, furniture, automotive, energy, electricity, metallurgy, shipping, defense industries. For the production of composite material apricot seed skin is used as main matrix. The apricot seed skin is grounded with crushers and classified according to grain sizes. For classification, the said fragments are sieved from sieves with predefined openings or sizes. The classified apricot seed skin particles according to grain sizes are mixed with epoxy adhesives. The used epoxy adhesive is between 2 to 5% as of total weight. The prepared mixture is poured into beforehand set molds. Pressure is applied to molds by taking care to grain sizes. For achieving controlled durability in final product, it is significantly related to the employed pressure to the development of obtained product composite material. The applied pressure amount is related to classified particles sizes. Thus, as the applied grading method is more precise or in another words if the classification can be done with control, the durability of the obtained product will be at defined and expected value.

The main matrix of the invention is apricot seed skin. The apricot seed skin cannot be used solely as a composite material. Composite material is obtained by addition of binding material to apricot seed skin particles. Since apricot seed skin is crushed into particles and liquid form of added binders provides

forming of desirable shape to the produced pieces. Moreover, its availability for machined or unmachined production provides easy production of pieces as for leveling property. With addition of dying materials to the main matrix apricot seed skin, products to be produced are colored. Also, addition or coating of chemicals to the composite material produced from apricot seed skin decreases its deflagration property. Lubrication property is added to the composite material produced from apricot seed skin. That is to say; by immersing into oil or adding graphite material self-lubricating pieces are produced.

For the production of composite material for industrial application with apricot seed skin use, grinding is undertaken in crushers. The grounded material is graded into size classes by sieving. By classifying fine grain, coarse grain composite material is produced by using phenolic and polymer resins. With addition of 2-50% phenolic and polymer resins of the weight of grounded material unification is obtained. During unification, while pressure is kept at minimum in fine grained material, pressure up to 15 tons can be applied to coarse grain material. The porosity between particles of coarse grained material is linearly linked to applied pressure. In other words, while grain size decreases porosity among particles decreases, porosity among particles of coarse grain material is increased. For lowering the porosity at minimum pressure is applied to the produced piece. Pressure and grain size effect porosity of composite material. By employing mechanical tests to the manufactured composite material, the proper area of utilization is determined.

For achieving desired shape, size and physical properties of the obtained composite material, specific pressure should be applied to the apricot seed skin in specific molds. The obtained products with specific dimensions can be shaped again by leveling with machined or unmachined production. Thus, standard plate formed products can be produced. Moreover, during molding and pressure application almost finished product can be achieved directly.

With the innovation defined here, insulation providing products with very high insulation values can be produced. Also, as a material with high durability is produced, the obtained product is suitable for using in bulletproof structures. With complex molding of composite material, desired sized bulletproof chest or armor to cars, buildings can be used.

Various experiment were undertaken at section taken from piece produced from apricot skin composite material. In Figure 1 a sample section to the said view is given (Figure 1a and 1b). Here micro and macro cracks are seen. In relation to the apricot seed fragments sizes variable macro cracks can be observed at grain margins. Micro cracks are generally appeared at surfaces as hairline cracks. These are related to the pressure employed during manufacturing. The density of composite material produced from apricot seed skin for coarse grains is 0,6708gr/cm3, the density of fine grained composite material is 0,6103g/cm3. These figures shows variability with the amount of added epoxy material to the composite material. The epoxy amount at measured values of used composite material is between 10-12%. The density values revealed significant lightweight when compared to other metallic materials. Some elements densities are; Fe 7,87g/cm3, Cu 8,94 g/cm3, Al 2.71g/cm3. Abrasion tests of composite material produced from apricot seed skin are undertaken (Figure 2). At experiments the target bulk product composite product is abraded with St 70 material. During obtaining abrasion values 50-200 N pressure were employed. Although no corrosion is seen on abraded composite material, very slight abrasion marks are recognized. Abrasion values are taken from sensitive balances based on weight losses. When these abrasion values are compared to metallic materials, very low values are obtained.

Moreover, corrosion is developed related to load and speed. The hardness of apricot seed is calculated as HRC 55. Also, various electrical insulation tests were undertaken. At the end of the studies, the piece with 1 cm section produced from composite material of the innovation subject while revealed 26 GΩ at 5KV voltage, the 3.5cm section of the same product revealed 100 GΩ capacitance.

CLAIMS

1. The innovation besides its durability, when required can be processed with machining, and is a composite material consist high amount of organic material thus unless special material addition can be utilized for producing solid electrically insulated parts or components, property: characterized as a mixture obtained from previously crushed and classified into certain size and shape of apricot seed skin and phenolic and/or polymer polyester

2. According to Requirement 1, it is an apricot seed skin based composite material, property: the said apricot seed skin, crushed into fine particles, and mixed with above said polyesters are shaped with certain pressure into previously prepared container and characterized as composite to be processed semi-finished or end product

3. It is an apricot seed skin based composite material according to Requirement 1 and 2, property; characterized as a product by semi-finished or end product that are machineable with machining/without machining

4. According to above mentioned any requirement, it is apricot seed skin based composite product, property; the said composite material is characterized as armor and/or bullet proof vest according to used polyester type, pressure value variables

5. According to above mentioned any requirement, it is apricot seed skin based composite product, property; the said material is organic and as it is self-insulator it is characterized as an good insulator or as an insulator material for noise, heat etc.

6. The innovation besides its lightweight, is durable and when required can be processed with machining, and is a production method of a composite material, can be used for producing electrically insulated part or components unless adding special material and consisting high amount of organic material, property; characterized by process stages of

- Crushing apricot seed skin separating into fine particles
- Separating said particles into specific classes by sieving from particular sieve sizes
- Mixing with specific amount of phenol and/or polymer polyester of the classified said apricot seed skin particles

7. The innovation is a composite material production method based on apricot seen skin according to Requirement 6, property; characterized with obtaining semi-finished or end product following the mixture of said apricot skin particles with polyester, based on desired hardness level related to pressurizing at suitable pressure

8. The innovation is a composite material production method based on apricot seen skin according to Requirement 6 and 7, property; characterized with obtaining semi-finished or end product following the mixture of said apricot skin particles with polyester, suitable to desired physical properties by mixing with dyes, metal dust or various chemicals.

9. The innovation is a composite material production method based on apricot seen skin according to the any Requirement above, property; characterized with, based on applied pressure and container, the integration of additional materials to self-insulated material, obtaining a product durable and resistant to outdoor conditions alike insulator material, electrical isolation material, armor, bullet proof chest

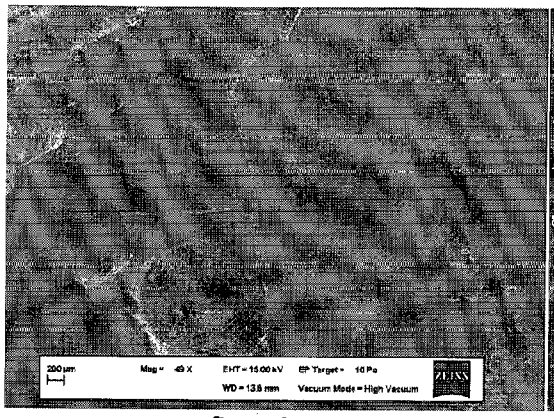


figure 1 a

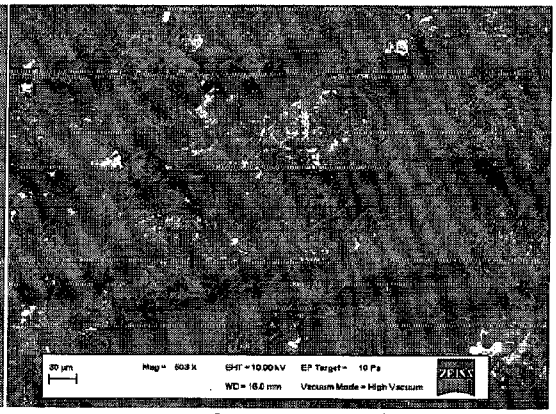


figure 1 b

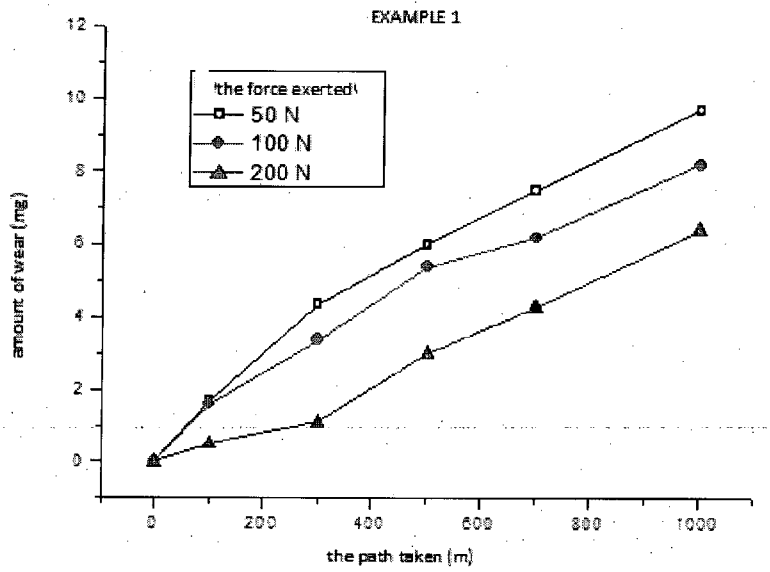


figure 2

INTERNATIONAL SEARCH REPORT

International application No
PCT/TR2014/000084

A. CLASSIFICATION OF SUBJECT MATTER
INV. C08L61/06 C08L67/06 C08L97/02 C08L99/00 F41H5/00
C08L63/00
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)
C08L F41H

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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[X] Further documents are listed in the continuation of Box C.

[X] 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 application or patent but published on or after the international filing date

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"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	Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

International application No
PCT/TR2014/000084

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 383 098 A1 (BASF AG [DE]) 22 August 1990 (1990-08-22) page 2, line 24 - page 3, line 29; claims -----	1,3,5,6, 9
X	US 2 507 465 A (AYERS JOSEPH W) 9 May 1950 (1950-05-09) column 1, line 1 - column 5, line 63; claims -----	1,3,5,6, 9
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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