



UNIVERSITY OF AVEIRO. TECHNOLOGY TRANSFER UNIT

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UNIVERSITY OF AVEIRO – TECHNOLOGY PORTFOLIO

UATEC – Technology Transfer Unit of the University of Aveiro, supports the University in its aim of being a national excellence centre of knowledge creation and dissemination by taking care of issues like intellectual property management and prosecution, as well as issues related to the promotion and valorization of the UA in-house developed technologies, in the marketplace. In the following pages we present some of the technologies that are currently available for licensing. They are organized accordingly to different domains: ICT (Information and Communication Technologies communication), Material Sciences, Life Sciences and Other.

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Technology Offers

ICT

Photonic true-time delay beamforming system based on polarization-domain interferometers

ABSTRACT

A group of researchers from Instituto de Telecomunicações of Aveiro, has been recently researching different RF signal processing systems based on photonic technology. The proposed system performs tunable beamsteering (or beamforming) of the electric field radiated by a phased array antenna. Thanks to photonic technology, the proposed system has a broad bandwidth and is essentially composed by passive devices. The university is searching for industrial partners interested for joint development and licensing agreement.

DESCRIPTION

Optical signal processing of electrical RF signal is generally composed by three stages: conversion of the electrical signal to the optical domain, optical signal processing (with all the advantages inherent to fiber optics), and conversion of the processed optical signals to the electrical domain. After electrical to optical conversion of the input RF signal, the proposed system produces N copies of the modulated optical signal, and additionally adjusts the amplitude and phase of each one of them. Each one of the N copies is converted to the electrical domain and then fed to the respective antenna element of the phased array antenna. Through the N phase adjusters and N amplitude controllers, it is possible to optimize and steer the electrical field radiated by the phased array antenna. As shown in the figure 1, the concept is simple as it resorts to a single delay line. The proposed system should find application in market niches where high frequency wireless signals are employed (>10 GHz).

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

The proposed invention has clear advantages in comparison with well known electrical techniques as well with photonic techniques proposed so far. The main advantages are:

- The concept is simple, as all components are passive and well known in photonic technology.
- Only one laser and one optical delay line are required, independently of the number of antenna elements.
- The optical bandwidth is only limited by the spectral width of the data signal modulated in the RF carrier, and not by the frequency of the RF carrier.
- The electrical bandwidth only depends of the bandwidth of the electrical to optical converter, which can reach up to 50 GHz.

DEVELOPMENT PHASE

Laboratory Tested- The system has been validated by a mathematical model and by simulations. A proof of concept experiment has validated the system up to a RF frequency of 30 GHz. Simulation and experimental results confirmed the mathematical model, and were recently published in one of the top journal of the area.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Production of advanced antennas for military applications or radioastronomy.

MARKET APPLICATIONS HIGHLIGHTS

The technology was successfully tested in applications such as CMOS transistors, MEMS and MIMs devices and multi-layers.

Photonic Instantaneous Frequency Measurement System Using Complementary Modulation

ABSTRACT

A group of researchers from Instituto de Telecomunicações, p.º de Aveiro, has been recently researching different RF signal processing systems based on photonic technology. The system proposed in the present invention measures the frequency and amplitude of an input RF signal. Thanks to the photonic technology, the proposed system has incomparable performance in comparison with conventional systems, currently based on high frequency electronics. More specifically, the proposed system has a very broad bandwidth and high sensitivity. The university is searching for industrial partners interested for joint development and licensing agreement.

DESCRIPTION

Optical signal processing of electrical RF signal is generally composed by three stages: conversion of the electrical signal to the optical domain, optical signal processing (with all the advantages inherent to fiber optics), and conversion of the processed optical signal to the electrical domain. The proposed system instantaneously maps the frequency of an input RF signal to a complementary pair of voltages. As a result, the measured frequency is independent of the laser's power as well of the amplitude of the input RF signal. The main innovation of the proposed system lies in the electro-optical modulator, which besides electrical to optical conversion also performs all the required optical signal processing. Therefore, the concept is simple yet innovative (as shown by the figure below), and should find application in market niches where precise frequency measurement is required. One of such niches is the market of electronic warfare.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

The proposed invention has clear advantages in comparison with well known electrical techniques as well with photonic techniques proposed so far. The main advantages are:

- The concept is simple, as the complexity of the system only lies in the modulation scheme. Besides electrical to optical conversion, the modulation scheme also performs all the required optical signal processing.
- Thanks to the complementarity of the two output voltages, the frequency measurement is independent of the laser power and of the amplitude of the input RF signal.
- The systems bandwidth only depends on the modulator, which can reach up to 50 GHz

DEVELOPMENT PHASE

Laboratory Tested- The system has been mathematically and experimentally validated up to an input frequency of 20 GHz. The experimental results confirmed the mathematical model, and were recently published in one of the top journal of the area.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs
- Joint Venture agreement

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Producer/distributor of electronic measurement equipment.

MARKET APPLICATIONS HIGHLIGHTS

The proposed invention can be applied in wireless warfare systems, microwave measurements.

Metallic Mg oxygen diffusion barrier diffusion applied for electronic devices

ABSTRACT

A research group has developed a new technology that consists of a method for producing electronic devices with an oxygen diffusion barrier, ultra-thin, with the composition of metal-Mg. The industry of electronic devices has among its biggest challenges the control of oxidation of metal electrodes. Manufacturers of electronic devices and / or MOSFET transistors (acronym for Metal Oxide Semiconductor Field Effect Transistor) are sought for the licensing agreement.

DESCRIPTION

The use of interlayers in the manufacture of electronic devices is made towards preventing the passage of oxygen to the metallic electrode and thus its oxidation. With the increasing miniaturization of electronic components, the use of interlayers is subject to its diminution, following the scale miniaturization of these components. Hafnium, amide precursors, ALD non-aqueous, other deposition techniques such as MBE, replacement of SiO₂ dielectric ultra-thin nitrided SiO₂ interlayers and nitride deposited, among others, are some of the solutions that have been tested over the past years, all showing deficiencies at various levels. This technology presents a new approach to the problems described.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

- Conformal coating of a HfO₂ thin film on top of the silicon substrate without intermixing between the interlayer and the oxide thin film on top without gradient due to change in density;
- Improvement of the electrical properties after post-deposition annealing;
- Presence of charges only due to the deposition technique we used for the deposition of the high gate dielectric (ALD).

DEVELOPMENT PHASE

Laboratory Tested

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Hardware electronics Industry

MARKET APPLICATIONS HIGHLIGHTS

The technology was successfully tested in applications such as CMOS transistors, MEMS and MIMs devices and multi-layers.

Temperature and/or microwave radiation intensity sensor based on optical fiber

ABSTRACT

A group of researchers has developed a new real time measurement and mapping sensor of temperatures and/or intensities of microwave radiation in environments with high electromagnetic noise, which finds applications in microwave ovens, and in industrial processes of development, production and quality control. The university is looking for measurement and monitoring devices or microwave ovens manufacturing companies for joint development and licensing.

DESCRIPTION

In regions with high microwave radiation intensity, such as microwave ovens, energy distribution depends on several parameters and therefore it is difficult to determine the heating pattern. Most of the currently known sensors do not meet the microwave radiation transparency requirements, because they affect the the radiation distribution. On the other hand, those sensors almost exclusively provide a qualitative evaluation of the distribution. This invention consists of a small size and highly flexible microwave radiation and/or temperature sensing device, immune to electromagnetic interferences and which enables the analysis of quantitative and real time measurements.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

Temperature and/or microwave radiation intensity sensor based on optical fiber,

- able to work in environments with high microwave radiation;
- small sized and with high flexibility
- that enables precise real time quantitative measurement analysis.

DEVELOPMENT PHASE

Laboratory tested. Successfully produced solid-contact ion-selective microelectrodes selective to H^+ and Mg^{2+} . Tests in other ionic species are planned, if interested is shown.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry: Measurement and monitoring devices companies; Microwave ovens manufacturing companies.

Citizen's Healthcare card

ABSTRACT

A research group of the University has developed a healthcare card, which safely gathers together the clinical information of each individual, both via local storage of data, and storage of pointers to users' clinical records spread over different information systems. The advantages include the ability to store multiple digital certificates, in addition to protect information confidentiality. The university is looking for information technology companies for licensing.

DESCRIPTION

The non-existence of solutions in the market that provide health professionals and citizens with a unique access point to clinical information is due to a delicate and diverse set of barriers. A first problem arises from the diversity of places where appointments, diagnostics and medical treatments take place, as well as from the use of different information systems. Furthermore the question of data amount and storage capacity is posed. Finally, other problem comes from information confidentiality issues and access and treatment of personal and clinical data. This invention aims at overcoming these problems, via a cryptographic citizen's healthcare card with controlled access through multiple digital certificates, allowing the obtention of an integrated and secure storage and access information system.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

A Citizen's healthcare card,

- which gathers together the whole clinical information of each individual, both via the local storage of data, and the storage of pointers to users' clinical records spread over different information systems;
- with controlled access through digital certificates;
- which protects information confidentiality and guarantees secure storage and access.

DEVELOPMENT PHASE

Laboratory tested

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing new applications
- Adaptation to specific needs

IP RIGHTS

Patent Granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Electronic card manufacturers. Public and Private Health Institutions

MARKET APPLICATIONS HIGHLIGHTS

The present invention finds application in the creation of a citizen's healthcare card, able to store in just one place the individual's clinical history.

Method and passive-remote pump control in power amplification systems

ABSTRACT

It was developed a new passive method for monitoring the amount of power to pump when operating an amplifier or a set of remote amplifiers in series. Over the past few years the communications sector has witnessed an exponential growth of data traffic, which can be bridged nowadays only through the implementation of optical networks. In order to these optical networks continues keeping up with the increasing number of users and the geographical spread of optical networks, and at the same time maintaining the network structure completely passive, it is imperative the use of Doped Fiber Amplifiers (DFA - Doped Fiber Amplifier).

DESCRIPTION

The use of pumps amplification in optical fiber networks is one of the solutions to increase network signal strength when the market experiment an exponential increase of number of users. However, it has limitations beyond the means of signal amplification, in particular regarding to security, due to the exposed location of these networks in areas of high population density. In order to address this problem, several proposals for optimizing the pump to draw power have been presented in the past few years. This technology represents a new approach to the problem, creating a new type of amplification, consisting of a flexible and secure subsystem (filter) to a specific extension architecture for GPON (Gigabit Passive Optical Networks) devices.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

This new method allows to independently oscilate the extra power provided by any of the amplifiers, thus

- minimizing the losses associated with the insertion of power and waste pump. A GPON has a range of 20km by definition, reaching 60km in the case of newest X-GPONs. With this technology it can reach the range to 100km.
- The filter is applicable for the distribution center (node), being shared by 32 to 64 users

DEVELOPMENT PHASE

Laboratory Tested - Early-stage prototype.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Optical-fiber networks equipment suppliers

MARKET APPLICATIONS HIGHLIGHTS

This technology applies the market for fiber optic communications, presenting itself as a solution to a new generation of metropolitan area networks (long reach access).

Optical reflectometer for monitoring the physical layer of optical networks

ABSTRACT

It has been developed an optic reflectometer operating in time domain and for use in mapping access optical networks. This monitoring system allows to find physical faults and verify the physical connectivity in any optical path through the placement of reflective elements and liabilities at critical points of the network. Companies in the field of physical layer of optical fibers and / or equipment suppliers for the same purpose are sought for license agreement.

DESCRIPTION

The new reflectometer consists in various passive reflective elements (PONs) that are placed along the physical layer of the optical fiber network. These elements create reference points, measurable as events such as reflective unequivocal trace produced by the reflectometer, unique both in time domain and frequency domain (or even at the domain of the wavelength). This monitoring strategy allows the mapping of any optical fiber network topology, short or medium range, since there is physical access paths to integrate the reflective elements. The space layout of the network elements that constitute this monitoring subsystem leads to the creation of unique reflective reference events, easily detected and localized by the reflectometer. These reflective elements also creates an unique signature for each optical path of the network, which enables remote identification of sections of fiber, and its related faults.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

Among several advantages this technology presents savings of bandwidth for spectral monitoring, easy integration into any access

optical network topology and the elimination of the limitations normally associated with other conventional techniques of reflectometry. This system enables the reduction of measurement time and time fault detection, which essentially leverages the significant reduction of associated costs to implement a RODT monitoring subsystem in the physical layer of optical fiber networks. In the service layer, the operators are allowed to provide to end users high levels of quality and service failure times reduced.

DEVELOPMENT PHASE

Laboratory Tested

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Adaptation to specific needs

IP RIGHTS

Patent granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Companies related to installation and maintenance of fiber optical networks or component manufacturers for the same purpose.

MARKET APPLICATIONS HIGHLIGHTS

With the emergence of passive access optical networks as a solution to overcome the limitations associated with reduced bandwidth and the increasing number of users, resulting from the provision of new data and voice services by operators, came the need to ensure quality of service, security, robustness and agility in the prevention and repair of failures.

Technology Offers

Material Sciences

Mortars containing phase change material microcapsules, their preparation process and use

ABSTRACT

A research group of the University has developed an invention that relates to a mortar for use on interior and exterior finishing of construction systems, comprising phase change material (PCM) microcapsules together with a lime binder and other auxiliary materials.

DESCRIPTION

The technology consists in the preparation of a lime based mortar coating and its incorporation with a phase change material (PCM). The addition of phase change materials improves the thermal performance of mortars used in interior and exterior coatings of construction systems, thus contributing to energy saving in buildings. The invention also concerns a process for the preparation of these mortars by blending the PCM microcapsules with the binder and other auxiliary products, in a mixing machine.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

- systems, in order to save energy. Aerial lime mortars are the most suitable for many historic buildings and there is no

solution in the market that aims the use of PCM in aerial lime mortars.

- The mortars are used as interior and exterior coating of construction

DEVELOPMENT PHASE

Available for demonstration - Field Tested

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Adaptation to specific needs
- Transfer of knowledge in new raw materials

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Construction and civil engineering industry

MARKET APPLICATIONS HIGHLIGHTS

Energy saving in buildings has gained increasing importance due to fuel price raise, the depletion of fossil fuels reserves and a growing environmental awareness. Increase of the energy efficiency in buildings is a way to achieve lower energy consumption.

New protection system against ballistic impacts and blast-waves generated by explosions

ABSTRACT

A group of researchers has developed a new protection system against ballistic impacts and blast-waves generated by explosions. It is based on a sandwich structure made of inner cork layers, composite or ceramic material and external metallic or composite layers. It may be used in vehicle and personal protection systems, and in building and other infrastructures protection systems. The University is looking for partners for the construction of the industrial prototype or interested in a licensing agreement.

DESCRIPTION

The research group responsible for this invention has been working for several years in the field of Defense Equipment and has conducted several studies for the construction of motorcycle helmets, using cork. This background led to the idea of developing a new protection system against ballistic impacts incorporating cork (natural raw material abundant in the Mediterranean). This could be substantially lighter than the protection systems that exist at present. The new protection system consists of a sandwich-like structural panel composed of several layers, characterised by having a layer made from a metallic alloy of ballistic application or, in alternative, a composite material, one or several layers of cellular materials, one or several layers of composite material and/or one or several layers of ceramic material, and finally a layer of ballistic metallic alloy or in alternative, of composite material. The invention panel is in the domain of the

protection systems against blast-waves originated by terrorist attacks (or other type of attacks or explosive reactions) and has preferential application in the fields of military or personal defence.

INNOVATIVE ASPECTS AND MAIN OFFER ADVANTAGES

- A lighter and more effective system than the current alternatives.
- Lower production cost comparing to current alternatives.
- The material around which the system is built is cork, a recyclable material that is abundant in Portugal (the country is the world biggest producer of cork) and in the Mediterranean

DEVELOPMENT PHASE

Laboratory Tested

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Adaptation to specific needs
- Financial Resources

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry: Producers of military transportation equipment (vehicles, ships); Producers of personal safety equipment (helmets, vests, etc); Producers of construction materials (walls, armoured doors and containers).

New process for encapsulating luminescent aluminates used in materials for self-cleaning hygienic surfaces, biomaterials, etc.

ABSTRACT

A group of researchers has developed a new process for encapsulating luminescent aluminates, which can be used in materials for self-cleaning hygienic surfaces, in the domain of constructive systems, biomedical systems, aquatic or high humidity level systems, antibiotics, vaccines and biomaterials. They are looking for companies producers of inorganic phosphorus and inorganic pigments in order to establish licensing agreements.

DESCRIPTION

This new process was developed because the research group has identified a problem in terms of hydrolysis of luminescent materials when in contact with water that needed to be solved, in order to be possible to process and/or apply the materials from aqueous suspensions. As such, this invention presents luminescent aluminates of Beryllium, Magnesium, Calcium, Strontium or Barium doped with Cerium (III) encapsulated with inorganic titanium dioxide (TiO₂)nanoshells that present new multifunctionalities, namely, photocatalytic antimicrobial, antibacterial action and water resistance properties. The encapsulation process of such aluminates involves dissolving the passivating agent, sodium titanate (Na₂TiO₃) under conditions of controlled pH, so that titania species are adsorbed onto the surface of aluminates through unsaturated bonds of surface atoms.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

The new process is simple, cost effective, and allows protecting photo luminescent materials against hydrolysis reactions. The resulting material offers unique antibacterial, antimicrobial and photo catalytic properties. The coating with titanium allows other functionalities for the materials, as titanium has photo catalytic effect.

DEVELOPMENT PHASE

Available for demonstration.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Adaptation to specific needs
- Financial Resources

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Producers of inorganic pigments and/or inorganic phosphorus.

MARKET APPLICATIONS HIGHLIGHTS

The luminescent aluminates encapsulated with TiO₂ can be widely used in hygienic self-cleaning surfaces, civil construction systems, biomedical systems, aquatic or high humidity level systems, antibiotics, vaccines and biomaterials.

Ceramics produced out of incinerator bottom ash

ABSTRACT

A group of researchers has developed ceramic materials produced out of incinerator bottom ash, resulting from municipal solid waste (MSW) incineration, to apply in floor and wall tiles. The advantages over the existing solutions, which use clay, quartz and feldspar as base raw materials, include economic gains, through the utilization of incinerator bottom ash, with or without inclusion of other additives; and environmental gains, through the recycling of a waste normally disposed in landfills, as well as, through the preservation of scarce mineral natural sources. The university looks for ceramic floor and wall tiles companies for joint further development and licensing.

- Economic gains, through the utilization of incinerator bottom ash, with or without inclusion of other additives;
- Environmental gains, through the recycling of a waste normally disposed in landfills, as well as, through the preservation of scarce mineral natural sources.
- Dense ceramics, with a granular structure, having adequate physical properties and mechanic resistance, to use as construction material;
- Ceramics with attractive esthetic characteristics;
- Application in the construction of floor and wall tiles.

DESCRIPTION

The manufacture of traditional ceramics usually uses clay, quartz and feldspar as base raw materials. These materials are in growing shortage. This technology offers an innovative solution with the production of ceramic materials out of incinerator bottom ash, resulting from municipal solid waste (MSW) incineration, which can be applied in the ceramics industry, particularly in floor and wall tiles. The production of these ceramic materials is strictly controlled. Due to a strong aggregation of the particles, an adequately dense ceramic with a granular texture is obtained, which is esthetically attractive and has adequate physical properties and mechanic resistance, to use as construction material.

DEVELOPMENT PHASE

Laboratory tested (laboratory prototype).

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Adaptation to specific needs
- Joint further development
- Testing of new applications

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Ceramic floor and wall tiles companies; Civil construction companies

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

- Ceramic materials produced out of incinerator bottom ash, resulting from municipal solid waste (MSW) incineration;

MARKET APPLICATIONS HIGHLIGHTS

This solution has applications in floor and wall tiles, bricks and tiles, decorative and utilitarian pottery and mosaics manufacturing.

Luminescent aluminate nanotubes doped with cerium and co-doped with other lanthanide ions for pigments used in optical devices, floor ceramic tiles, paints

ABSTRACT

A group of researchers has developed new luminescent nanomaterials, called luminescent aluminate nanotubes doped with cerium (III) and co-doped with other lanthanide ions, which can be widely applied in raw materials used in optical devices, such as sensors and biomarkers, photoluminescent floor ceramic tiles, paints, etc. The University is looking for companies who produce inorganic phosphorus and inorganic pigments, in order to realize licensing agreements.

DESCRIPTION

This new process was developed because the research group has identified a problem in terms of hydrolysis of luminescent materials when in contact with water that needed to be solved, in order to be possible to process and/or apply the materials from aqueous suspensions. As such, this invention presents luminescent aluminates of Beryllium, Magnesium, Calcium, Strontium or Barium doped with Cerium (III) encapsulated with inorganic titanium dioxide (TiO_2) nanoshells that present new multifunctionalities, namely, photocatalytic antimicrobial, antibacterial action and water resistance properties. The encapsulation process of such aluminates involves dissolving the passivating agent, sodium titanate (Na_2TiO_3) under conditions of controlled pH, so that titania species are adsorbed onto the surface of aluminates through unsaturated bonds of surface atoms. The motivation for the development of this invention was essentially driven by the will to create innovative solutions that facilitate the life of disabled people, producing new products with the property of persistent (light emission longer than 10 hours), in a nano scale. The present invention provides luminescent aluminate nanotubes doped with cerium (III),

and co-doped with other lanthanide ions (Ln is La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Yb, Tm or Lu). These luminescent nanotubes are obtained by a synthesis process which consists in a thermal treatment of post-annealing from precursor micro- and nanoparticles, under temperature range equal or higher than 573 Kelvin, for a minimum time of 30 minutes. These luminescent nanotubes result in light emissions in the visible ultraviolet and infrared regions.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

New material that offer a novel photoluminescent nanostructure nanotube-shaped, having as an advantage a synthesis process that allows a large scale production of nanotubes.

DEVELOPMENT PHASE

Laboratory tested.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Adaptation to specific needs
- Joint further development
- Testing of new applications

IP RIGHTS

Patent granted (National)

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Producers of inorganic pigments and inorganic phosphorus.

MARKET APPLICATIONS HIGHLIGHTS

This Technology can be widely applied in raw materials used in optical devices, such as sensors and biomarkers, photoluminescent floor ceramic tiles, and paints, etc.

Mineral pigment composition used in paper coating suspensions for inkjet printing

ABSTRACT

A group of researchers has developed a new paper coating formulation, particularly conceived for inkjet printing. Out of this solution, successfully laboratory tested, a semi-matte paper, with a high delta gloss value, is obtained. This outcome responds to a patent market need of production of the most adequate pigment for coated paper. The university is looking for pulp and paper companies for joint further development and licensing.

DESCRIPTION

Historically, kaolin has been the main pigment applied in paper coating, due to the strongly lamellar character of kaolinite particles. However, this traditional trend has been changing. That is due both to economic and technical issues, since the perfect pigment does not exist. Calcium carbonate is a good example of a substitute mineral, because it is cheaper, whiter, has a better coating suspension rheological behavior, i.e., as far as fluidity adaptation is concerned, among other advantages. The substance has, however, some drawbacks as well. The developed solution is innovative because it combines the advantageous properties of calcium carbonates with those of kaolin, through a blending, in different proportions, of both particles, taking therefore advantage of the best intrinsic characteristics of each. This composition is applied in the preparation of paper coating suspensions, which, besides those pigments, also contain rheological modifiers, so as to make it more fluid, and binders, in order to fix the coating layer to the base paper. This process gives rise to a semi-matte paper, placed in-between matte and high gloss paper, with a low coating grammage – with no implications to the brightness level –, very low

roughness, a low level of ink penetration, and with a high delta gloss value. Those characteristics positively influence the printing

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

The developed paper coating formulation:

- gives rise to a semi-matte paper, with a high delta gloss value, and, consequently, higher quality level of inkjet printing;
- is cheaper than existing solutions because of the low coating grammage;
- its brightness is not affected by the paper weight reduction;
- is highly smooth;
- shows a low level of ink penetration because of its porosity control;
- is particularly conceived for both black and color inkjet printing quality

DEVELOPMENT PHASE

Laboratory tested

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Adaptation to specific needs
- Joint further development
- Testing of new applications

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : pulp and paper companies

MARKET APPLICATIONS HIGHLIGHTS

This solution finds application in coated paper – semimatte paper - for inkjet black and color printing.

Water saving system for water or boiler heaters

ABSTRACT

A researcher has developed a system for water or boiler heaters, aiming to promote potable water saving that usually goes down the drain. The invention assures that the water is above a preset temperature. The advantages of this invention comprise economic and environmental gains. The university is looking for water or boiler heater companies for joint development and licensing.

DESCRIPTION

Existing water heaters do not immediately provide hot water. The water that initially reaches water valves or taps does not meet the users' temperature needs and therefore potable water goes down the drain. Water waste in manufacturing settings increases costs and reduces production capacity. This technology consists of a means for water saving, which makes sure water arrives at a sufficiently high temperature, preset at the water heater, where most users will proceed to use the water, or where water is at sufficient temperature for manufacturing applications. The water, that in the initial working stage of the water or boiler heater, is below the requested temperature is, by pressure, directed towards an accumulation reservoir, and is afterwards reused to supply water to the hot water or boiler heater. The technology operates automatically, depending on the pressure or on the temperature of the water in given parts of the system, and can be implemented in newly manufactured water or boiler heaters or retrofitted into existing ones.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

- Water saving system for integration in water or boiler heaters;
- System that allows for elimination of water wait intimately related to waiting time to obtain hot water;
- System that can be implemented in newly manufactured water or boiler heaters;
- System that can be retrofitted into existing water or boiler heaters;
- System that can have both for industrial and domestic uses;
- System that comprises economic gains through water saving promotion and automatic operation, without human intervention;
- System that comprises environmental gains through potable water saving promotion, and non requirement of any additional mechanical, electrical or other supply device.

DEVELOPMENT PHASE

Laboratory tested

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Water or boiler heater companies

MARKET APPLICATIONS HIGHLIGHTS

This invention aims at being integrated in water or boiler heaters, both for industrial and domestic uses. Its application can be optimized

through integration with mixing valves placed at hot water tabs.

Combined fixation bone implant

ABSTRACT

A research group has developed a combined system for bone implant fixation (metallic or non-metallic) that for its geometry allows the implant fixation through 2 different and simultaneous ways, combined, that allows optimal fixation and minimize bone lost and fractures (common by actual techniques) when the implant needs to be removed. The University is looking for prosthetics companies and surgery equipment producers for licensing.

DESCRIPTION

The actual techniques are divided in 2 big areas: the cemented implants and the cementless, AKA pres-fit (a sort of fitting by mechanical properties). The primary advantage of the cemented implants is the fast post-surgery stability. In the other hand this way of conventional fixation requires the removal of a large part of bone, even bigger than the implant itself, to lodge the cement layer. In case of removal of the implant, it is also very difficult for surgeons to perform it, and the procedure most of the cases ends up with a great bone loss and fractures during the surgery. Regarding the cementless implants, depending on the surface texture type and also the devices used to fix it by mechanical properties, it could provoke a better or worst fixation of the implant. The implant resistance, in this cases, are expectable to be lesser. The mixed/combined system developed allows to minimize those advantages, resulting in a

implant with optimal fixation and resistance and, in the other hand, in case of removal for replacement, decrease substantially the risk of bone losses and fracture.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

Because of its characteristics, in this combined system the surface area (coated with any material or structure to stimulate the fixation and/or the integration with the bone or bone tissue) is still in direct contact with the bone tissue and allows the rest of it to be fixed through cementing the bone between the bone itself and the bone tissue. This procedure minimizes bone losses when the implant is been placed and also when removal is required for replacement.

DEVELOPMENT PHASE

Available for demonstration (prototype)

TYPE OF COLLABORATION SOUGHT

- License Agreement

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Prosthetics or surgery materials

New construction method for masonry arch bridges and passageways

ABSTRACT

A research group has developed a new method of bridge and passageway construction, using a masonry arch structure and non-reinforced concrete as the key material. With low environmental impact, the advantages include fast and straightforward building methods, reduced structural maintenance, and durable and resistant material to which construction waste can be added. Prefabricated structure companies are sought for joint further development and licensing.

DESCRIPTION

The present solution for bridges and passageway construction is innovative in terms of structural typology, material used and building method. Precast concrete products for bridges and passageways are currently available in the market, but are composed of reinforced concrete and have a beam structure, mostly resistant to tensile strength. The structure currently developed is an arch masonry structure, essentially resistant to compressive strength. The geometry of the structure is similar to Roman arch bridges. These are considered reference engineering structures and have important advantages over present solutions which use reinforced concrete blocks, particularly low maintenance and high durability. Existing arch masonry bridges are typically composed of stone or ceramic blocks and their building methods imply complex arch building techniques and high labor costs. This technology has non-reinforced concrete as its key material. It is not subject to oxidation processes. Construction waste material can be incorporated in the concrete blocks. The building method uses a metallic centering system, which allows for fast and straightforward masonry arch construction.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

- Masonry arch structure, resistant to heavy loads and compressive strengths;
- Use of non-reinforced precast concrete blocks, with flexible geometry;
- Extremely durable and resistant material;
- Low environmental impact, through avoidance of steel and incorporation of construction waste in the concrete blocks;
- Fast building method: 1 up to 2 days, as opposed to 30 days required in existing solutions;
- Up to 50% construction cost reduction, due to fast and straightforward building methods and non-required use of high quality concrete;
- Low or reduced structure maintenance, through avoidance of oxidation process typical of steel structures.

DEVELOPMENT PHASE

Available for demonstration

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Prefabricated structures companies;
Construction companies; Road concession
companies.

MARKET APPLICATIONS HIGHLIGHTS

This solution finds application in the construction of small and medium-scale bridges, underpasses, rivers and drainage water. It can also be integrated with other processes essential to arch bridges, such as walls, floors, railings and guardrails, and others.

Production of mixed-metal-oxide inorganic pigments from metallic waste

ABSTRACT

It was developed a process to produce mixed-metal-oxide inorganic pigments using industrial waste as raw materials. The industrial sludge can be a mix of the following metals: chromium, nickel, iron, copper, magnesium and zinc. Selected wastes might be used in the asreceived condition or after drying or calcination. Industrial partners from the field of metalmechanicals, ceramic or waste management are sought for a licensing deal.

DESCRIPTION

This process comprises the following steps: (i) characterization and selection of wastes; (ii) their treatment, if required; (iii) formulation + dosing + mixing of components; (iv) drying + calcination; and (v) washing + milling. Next the sludge is mixed with alcohol and dried at 110 degrees Celsius in electronic oven. Afterwards the dried material is heated at a temperature below the melting point of the metals to removal any volatile waste. Finally the material is washed and milled into a fine powder

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

- Significantly reduce waste disposal costs. Currently, it costs approximatly 0.10 cents a liter to dispose of waste and this technology would drop the cost to an estimated 0.01 cents a liter;
- Integrating this process is easy and inexpensive because the two large ovens that account for the majority of the equipment of the technology are inexpensive and commercially available;

A plant integrating the process would not need to restructure how it processes waste, the process is stand alone;

- It may also be possible to combine the metallic waste process into existing hardware used in their existing waste stream management process. In the plating industry, water removal is key to minimizing disposal costs;
- Many companies already have a process in place to extrude water from the sludge to reduce weight;
- The entire process to convert metallic waste is low energy
- Combined with the reduction in disposal costs this process is price competitive
- No hazardous bi-products. It has been shown in lab tests that the process can eliminate hazardous species. This means the pigment powder may also be useful in fertilizers.

DEVELOPMENT PHASE

Laboratory tested.

TYPE OF COLLABORATION SOUGHT

- License Agreement

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Metalmechanical, ceramic or waste management

MARKET APPLICATIONS HIGHLIGHTS

The present invention deals with materials that are produced by colorants or pigments producers mainly for use in the ceramic sector, since formulations are stable at high temperatures and act as colorants of glazes or ceramic bodies. The use of high temperatures might also assure the desirable inertization of possible hazardous species.

Ion-selective dry microelectrode of solid contact and its production method

ABSTRACT

It has been developed a new type of dry ion-selective microelectrode. The electrodes or ion-selective microelectrodes (or ISE) are generally used in chemical analysis, to provide real time information about the presence of ions or other specific compounds in complex samples. This new microelectrode features a new ion selective membrane composition by changing your criteria of selectivity. Manufacturers of equipment to scientific instrumentation are sought for licensing agreement.

DESCRIPTION

The presented invention relates to an ion-selective solid contact micro electrode with the length of the measuring point preferably but not limited to equal or less than 10 micron, particularly 0.5 - 10 micron, a method for producing such an electrode and use of an ion-selective solid contact micro electrode as a working electrode in diferente scanning measuring systems, such as SECM, SIET, MIFE and others, for measurements activity (concentration) of different ions in the modes of three-dimensional gradient scanning, plane two-dimensional scanning, vertical or horizontal profiling, one point measurements or any other point by point measurements over an active surface. For example, the present invention aims to substitute the glass-capillary micro electrodes used in localised measurements. The invention describes a needle-shaped rigid electrically-conductive substrate; an insulation layer, except in the tip of said substrate; an electrically-conductive layer; and a layer of ion-selective membrane.

INNOVATIVE ASPECTS AND MAIN OFFER ADVANTAGES

This new dry microelectrode that can be used to measure the location and concentration of ions can also be utilised for biomedical research applications. It is more robust than the current microelectronic (which uses metal instead of glass). Its stability is also higher, and most likely not be more costly. The current microelectrodes made of glass (with fluid - ion - inside) are not a commercial success because they do not resist to transportation.

DEVELOPMENT PHASE

Laboratory tested. So far it were successfully produced the solid-contact ion-selective microelectrodes selectives to H^+ and Mg^{2+} . However, there is plans to test in other ionic species if and when we are interested to try.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Scientific instrumentation. Laboratory equipments and biomedical research.

High performance sealant using silicon nitride rings with diamond film coatings

ABSTRACT

A research group has developed a high performance sealing system, composed of rings produced by the ceramic coating of silicon nitride (Si_3N_4) with diamond films obtained by CVD (Chemical Vapor Deposition value). This sealing system has a low friction, high wear resistance, high levels of adherence and a good sealing capacity. Companies from different sectors of industry that operate systems of fluids carriers are sought for a license agreement.

DESCRIPTION

The technology consists in the production of sealant rings which ensure the sealing of shafts in circulation systems of fluids of different nature and subject to drastic tribological applications, mechanical and/or chemical. The ceramic materials are a class in development for this type of application. The Si_3N_4 , among the technical ceramics, is a material with better mechanical properties. In turn, the diamond is one unsurpassed material terms of hardness and chemical inertness. The rings can be used to seal pipes to transport fresh or salt, cold or hot water, oil, gas and chemical and pharmaceuticals compounds.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

Regarding the potential use of diamond CVD on sealing systems, nowadays the poor adherence

to conventional substrates carbide is the main factor limiting the lifetime, not leading to this application. However, this technology surpasses this limitation through proved (through the research performed under the development of this technology) high adhesion of CVD diamond films by the Si_3N_4 , in what follows the production of sealing rings of this ceramic material.

DEVELOPMENT PHASE

Laboratory tested. Tribological tests performed on prototypes of dynamic mechanical sealing systems.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent (s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Water and gas carriers, oil, automotive, aerospace, shipbuilding, chemical and pharmaceutical industries, specific related to the transport of fluids and gas.

MARKET APPLICATIONS HIGHLIGHTS

Pumps for fluid transport, autoclaves, steam turbines, refrigeration systems, mechanical agitators rotary engines of submarines and ships, air-conditioning compressors for motor vehicles, turbines for aerospace, transportation, gas, chemicals and pharmaceuticals.

Simple and Innovative Pigment used in the production of matte paper for inkjet printing

ABSTRACT

A research group of the University developed a formulation to be applied in coated paper, based on trihydrated alumina (THA), a pigment with high standards of brightness and whiteness, applied together with starch, gives rise to a coated paper with matte characteristics. The invention intends to get a matte paper with an excellent finishing for inkjet printing. The main advantage of this process is the simplicity of the present technology and the production of a coated paper with high delta gloss standards excellent for inkjet printing.

DESCRIPTION

Trihydrated alumina (THA) is a pigment applied in several applications but is not common in paper especially as pigment for coating. In the present invention, THA was obtained from a commercial product that was subjected to a particle size manipulation (engineered pigment) in order to get a pigment with characteristics for paper applications. THA application on the base paper is done together with another compound. The coating formulation is very simple, shows adequate rheological properties giving rise to a coated paper surface with topographic characteristics for inkjet printing. Coated weight is very low, is a very thin coated layer, with high brightness and whiteness, but with some roughness in order to obtain a matte paper. Sheet gloss is very low but print gloss is especially high, so, delta gloss is high, with very high print quality standards.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

The present invention has the following advantages:

- Formulation simplicity when compared to what is usual in coating paper processes;
- Application of engineered THA with bohemitic structure, with lamellar particle shape, and with high brightness, especially designed as pigment for paper coated;
- Production of coated paper with a very low coating grammage, with some roughness giving a matte paper, ideal for inkjet printing and with high delta gloss values.

DEVELOPMENT PHASE

Tested in laboratory conditions.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent (s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry: paper and pulp industry.

MARKET APPLICATIONS HIGHLIGHTS

Paper market niche : matte papers.

Composition of bioactive glasses, its use and method of obtaining thereof

ABSTRACT

A group of investigators developed bioactive glasses and glass-ceramics able to develop a surface layer of carbonated hydroxyapatite after one hour of immersion in simulated body fluid (SBF). The invention covers a varied series of materials (porous scaffolds, fibers and meshes, granules and powders for bone regeneration and tissue engineering, bioactive fillers for bone cements used in orthopedics and odontology and for coating metallic implants). The advantages of the materials and methods object of this invention, relatively to the state of the art solutions, include the easy processing of the powders in aqueous environment, the complete densification of the glass matrix up to 800°C without devitrification, high flexural strength (~85 MPa), enhanced bioactivity and lower degradation rate in comparison to the 45S5 Bioglass[®].

DESCRIPTION

The bioactive glass compositions of the present invention are preferably free of alkaline metals and they belong to the following systems: Diopside ($\text{CaMgSi}_2\text{O}_6$) – Wollastonite (CaSiO_3); Diopside ($\text{CaMgSi}_2\text{O}_6$) – Fluorapatite [$\text{Ca}_5(\text{PO}_4)_3\text{F}$] – Tricalcium phosphate ($3\text{CaO} \cdot \text{P}_2\text{O}_5$), being able to include oxide dopants, such as Ag_2O , CuO , SrO , ZnO , MnO , Bi_2O_3 , etc., stimulating the enzymatic and cellular activity, or playing a bactericidal role. The bioactive glass compositions can be prepared by the melt route or by sol-gel. The X-ray patterns of the bioactive glass powders after immersion in SBF during 1-3 h reveal much faster biomineralization rates when compared with that of 45S5 Bioglass[®]. The bioactive glass powders can be easily dispersed in water to obtain stable and highly concentrated suspensions with good aptitude for colloidal

processing and for the rapid fabrication of scaffolds by robocasting, thanks to his low solubility translated by a weight loss of only 1.6 % at the end of 5 days of immersion in of Tris HCl (pH: 7.25) solution. His aptitude for densification without the occurrence of crystallization, or turning in a dense glass and amorphous mass with some fine crystals of diopside ($\text{CaMgSi}_2\text{O}_6$), and/or wollastonite (CaSiO_3) and/or fluorapatite [$\text{Ca}_5(\text{PO}_4)_3\text{F}$] with several proportions between the amorphous and crystalline phases constitutes another innovative aspect of the present invention. The weak devitrification trend also enables drawing of glass fibres from the melts, which can be used to produce flexible porous bioactive fabrics or meshes.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

The present invention has clear advantages relative to the existing technologies, such as:

- Exceptional biomineralization capacity through the formation of a carbonated hydroxyapatite layer upon immersing in SBF.
- Low solubility when compared with that of the 45S5 Bioglass[®]. This property allows the formation of a strong bond between the implant and the bone tissue, oppositely to what happens with the 45S5 Bioglass[®], and other bioactive glasses thereof inspired.
- The low solubility allows still the easy processing in aqueous environment without the risk of the incident of coagulation (common phenomenon in case of the state of the art bioglasses) and to optimize the rheological properties of the suspensions intended for the production of scaffolds.
- The good sintering ability allows the attainment of glass scaffolds and with high flexural strength.

DEVELOPMENT PHASE

Tested *in vitro* in SBF, and in cell cultures.

In vivo tests in definition..

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent (s) applied for but not yet granted.

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Biomedical Industry. Clinical Institutions (for clinical tests)

MARKET APPLICATIONS HIGHLIGHTS

Bioactive glasses in the form of porous scaffolds, granules, fibres, meshes, particles, fillers for orthopaedic and dental cements, or bone fillers in bone augmentation surgeries, periodontal diseases and in bone regeneration in several orthopaedic applications, or as powders for coating of metallic implants by plasma spraying or by other thermal spraying techniques, or coatings deposited by sol-gel, as well as in tissue engineering applications.

Procedure for the production and use of porcelain stoneware tiles with anti-bacterial activity

ABSTRACT

A group of researchers from the university has developed a process to obtain porcelain stoneware tiles with anti-bacterial activity, namely, that promotes the bacteria's death while all the other required technological characteristics, particularly the chemical resistance and anti-staining properties, are assured. In comparison with the existing solutions the two advantages of this process are: (i) the use of a common raw material in the porcelain stoneware tiles processing and (ii) the no need of radiation being only necessary the direct contact with the bacteria.

The developed material can be used in the revetment of places where the anti-bacterial properties are relevant (hospitals, kindergartens, etc.).

The university seeks for producers of porcelain stoneware tiles or ceramic pigments.

DESCRIPTION

The developed product has anti-bacterial action which was proven by determining the survival of Gram-positive bacteria, *Staphylococcus aureus*, and Gram-negative, *Escherichia coli*. This new feature of porcelain stoneware tiles comes from the use of a ceramic pigment and a chemical and a thermal treatment.

Once the ceramic pigment is already used in this type of products to achieve aesthetic effects the cost increase, of the material with antibacterial properties,

comes only from the expenses associated with the chemical and thermal treatments. The developed product has anti-stain features, belonging to class 5 (ISO 10545-14), and is chemically resistant being classified, according to ISO 10545-13, as UA, ULA and UHA for all the tested chemicals, except for the hydrochloric acid solution 18% (v/v) which promotes a slight chemical attack on its surface (UHB).

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

This invention provides clear advantages over the existing technologies. On the contrary of the existing in the market this material, to be effective, do not need to be exposed to radiation being only necessary the direct contact with the bacteria's. In addition, uses a raw material (a ceramic pigment) that is already normally utilized in this type of products only with aesthetical purposes. Its manufacturing process is easy and does not imply the equipment acquisition.

This material, in addition to technical and aesthetic characteristics that already possessed, has another feature: the anti-bacterial effect.

DEVELOPMENT PHASE

The material was developed and tested in the laboratory; however, the firing was performed in an industrial furnace. The obtained results are very promising. The ceramic pigment addition leads to a porcelain stoneware tile with an anti-bacterial efficiency of 51% for the *E. coli*. After the chemical and thermal treatments these values rise to 81%, for the *E. coli*, and to 78% for the *S. aureus*.



TYPE OF COLLABORATION SOUGHT

- License Agreement

IP RIGHTS

Patent (s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry . Producers of porcelain stoneware tiles or ceramic pigments.

MARKET APPLICATIONS HIGHLIGHTS

The present invention finds application for the revetment of places where the anti-bacterial properties are important such as hospitals, nurseries, etc.

Technology Offers

Life Sciences

Chemical compounds with antioxidant properties proposed as therapeutic agents

ABSTRACT

A group of researchers from a Portuguese university has developed a series of chemical compounds with antioxidant properties, which can be used in beauty care and in the treatment and/or prevention of certain pathologies. The technology consists of polyphenolic xanthenes, with a well-defined chemical structure, which have strong antioxidant activity. The advantages over existing solutions include the superior antioxidant potential over the so far most effective antioxidants of the flavonoid/polyphenol families, quercetin and resveratrol. For example, at the same concentration, the protector power of these compounds is 3 times higher than that of quercetin, in protecting human LDL from oxidation, LDL being one of the hallmarks of cardiovascular diseases. They are 4 times more effective in protecting human skin cells from the oxidative stress. The university is looking for biomedical and cosmetics companies for joint further development and licensing.

DESCRIPTION

Free radicals play an important and sometimes vital role in a number of human biological processes. However, these substances also have a dark side and can cause side reactions resulting in cell damage and cellular activity and metabolism mutation, which, in turn, can lead to malignancy. This imbalance is intimately related to oxidative stress, which is involved in many diseases, such as cardiovascular and neurodegenerative diseases, cancer, skin ageing, among others. Antioxidants play a key role as defense mechanisms to prevent and/or reduce the impact of the above mentioned pathologies. Some plant-derived flavonoids and polyphenols, quercetin and resveratrol, are widely used in cosmetics and/or health and

food industries, due to their antioxidant properties. Our technology consists of polyphenolic xanthenes, with a well-defined chemical structure, which have strong antioxidant activity. These antioxidants may act as therapeutic agents in clinical applications - namely in newdrugs production. They can be formulated for the beauty care industry as well. The advantages over existing solutions include the superior antioxidant potential over the so far most effective antioxidants of the flavonoid/polyphenol families, quercetin and resveratrol. For example, at the same concentration, the protector power of these compounds is three times higher than that of quercetin, in protecting human LDL from oxidation, LDL being one of the hallmarks of cardiovascular diseases. They are four times more effective in protecting human skin cells from the oxidative stress. The invention therefore offers more effective solutions, potentially not toxic to the human being. These compounds can be proposed as an antioxidant therapy both for pathologies in an acute phase, and in chronic preventive care. Other competitive advantages comprise their use of as preventive agents in cancer and skin ageing.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

- Chemical compounds with antioxidant properties, which can be used in beauty care and in the treatment and/or prevention of certain pathologies;
- Chemical compounds with antioxidant properties, which consist of polyphenolic xanthenes, with a well-defined chemical structure;
- Chemical compounds with antioxidant properties, with superior antioxidant potential over the so far most effective antioxidants;

- Chemical compounds with antioxidant properties, with a protector power 3 times higher than that of quercetin, in protecting human LDL from oxidation;
- Chemical compounds with antioxidant properties, 4 times more effective in protecting human skin cells from the oxidative stress;
- Chemical compounds with antioxidant properties, which can be proposed as an antioxidant therapy both for pathologies in an acute phase, and in chronic preventive care;
- Chemical compounds with antioxidant properties, which can be used as preventive agents in cancer and skin ageing.

DEVELOPMENT PHASE

Laboratory tested

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Biomedical companies; Cosmetics companies

MARKET APPLICATIONS HIGHLIGHTS

This solution finds application in antioxidant therapy both for pathologies in an acute phase, and in chronic preventive care. It can also be used as a preventive agent in cancer and skin ageing.

Scintillating optical fiber dosimeter

ABSTRACT

A group of researchers at the University has developed a dosimeter for low energy and low dose rates. The invention aims to monitor the dose levels, applicable to the field of nuclear physics and medical physics, particularly in radiotherapy. This device has also application in the dose control and monitoring in imaging systems based on ionizing radiation and in industrial control and monitoring. The advantages of this technology in relation to existing technologies, allow the application in brachytherapy modalities for which other devices are not sensitive enough or do not meet the requirements for *in-vivo* and real time dosimetry. The University seeks companies for investment and support in the phase of R&D, licensing, marketing and sales.

DESCRIPTION

A dosimetric device is proposed, that meets the requirements for dose determination in different forms of brachytherapy, showing high sensitivity for low or moderate doses of low energy radiation. The present invention is useful for dosimetry in radiotherapy, particularly in systems of low dose and low dose rate, for example, in brachytherapy. Brachytherapy has become the first choice for the treatment of various cancers forms. The increasing use of this therapy results from new developments that allow a better planning and more efficient delivery of the radiation dose. Usually, the absorbed dose is determined by a dosimeter ensuring the quality of these treatments through an efficient control of the dose delivered to the tumor and healthy tissue. For these applications, the commercially available solutions are restrictive and costly, not satisfying many of the desirable requirements for dosimetry, such as high sensitivity or small dimensions.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

The present invention has the following advantages compared to existing technologies:

- High degree of portability, factor which contributes positively to its application to other situations / areas. It may serve to ensure public safety by monitoring the improper possession and transport of radioactive sources or by controlling and monitoring in industry. Among other uses, its applications include the security of airports, hospitals, public transport, laboratories and clinics and generally in the control of radiation in an industrial environment.
- Dosimeter for low power and low dose rate with an operating principle based on an organic scintillator, allowing its use *in vivo* and real time measurement.
- Low production cost.
- Ease of handling and operation.

DEVELOPMENT PHASE

Principle of operation tested. Currently on optimization phase seeking tests in a clinical setting.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Biomedical companies; Producers of Medical equipment, radiation measuring equipment, electronic equipment.

Equipment and flow extraction process of biological and chemical contaminants

ABSTRACT

It was developed an innovative equipment and process of extraction, that can be applied in the assessment of the level of chemical and microbiological contamination of food and packaging that, with respect to current procedures, has the advantage of being more efficient, fast, simple and not expensive. The invention allows that the products under extraction may be passed through a fluid under pressure, which in few seconds extracts its microorganisms and chemical contaminants. This equipment can be used at laboratory level, or can be easily integrated on an industrial production line.

DESCRIPTION

The developed equipment allows assessing the level of microbiological and chemical contamination of food and packaging materials. These products are crossed by a fluid under pressure, which acts as a solvent and, in a few seconds, extracts the microorganisms and chemical contaminants of the products that want to be analyzed. Several fluids may be used according to the type of sample that needs to be analyzed and the physical-chemical properties of the contaminants to be extracted. At the end of the process, a liquid extract was obtained that, in addition to the food inherent chemical constituents, also contains biological and chemical contaminants. This extract may be then analyzed using rapid methods, such as bioluminescence to quantify the level of microorganisms and, for example, chromatography for analyze the chemical contaminants.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

This equipment presents several advantages when compared to the existing technologies, such as low time of extraction, extraction

efficiency, simplicity, and its use is not expensive. This equipment is highly versatile; it may be used at laboratory level, or may be easily integrated on an industrial production line, at different steps of production (i.e. during and after food processing). Products and contaminants with different physical-chemical properties may be considered. Furthermore, the conventional methods for analysis of microbiological contamination level are dependent on plate culture methods, which are time consuming and require a specialized microbiology laboratory, and the present invention avoid these limitations.

DEVELOPMENT PHASE

This invention has been designed and developed at the University of Aveiro (UA). A prototype has been tested in the laboratory and is available for presentations and demonstrations. The functional prototype was optimized, and adapted to different types of products and contaminants.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry: Company of production or commercialization of laboratory equipment. The partner can fabricate, sell or distribute equipments for laboratories that provide services, and for producers and distributors of food products, and other food marketing agents.

MARKET APPLICATIONS HIGHLIGHTS

The present invention is related to the activity of analysis, monitoring and control of the presence of chemical and biological contaminants in solid products, especially in food industry and related ones.

Equipment for food quality and safety control. The use of this equipment and related extraction method of chemical and biological contaminants may also, in the future, be extended to other types of samples and market segments.

Method for obtaining an extract rich in triterpenic acids from eucalyptus barks

ABSTRACT

A group of researchers from CICECO Associated Lab, University of Aveiro, has developed a process that allows obtaining extracts with high content of triterpenic acids from the outer bark of eucalyptus.

DESCRIPTION

The technology consists in a new process that allows obtaining extracts with high content of triterpenic acids from the outer bark of eucalyptus.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

This is a process that with a simple set of unitary operations allows to get extracts with high triterpenic acids contents (up to 98%), from crude extracts of eucalyptus bark, whose abundance in these crude extracts is lower than 50%. This process can be easily integrated with existing pulp production. As only about 1% is extracted during this process, the subsequent exploitation of bark for energy production is possible.

DEVELOPMENT PHASE

Tested at laboratory scale. Scale up studies and economic analysis are promising.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent (s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry: Pulp industry (producers of eucalyptus bark) and phyto-pharmaceutical and cosmetic industry (product consumers)

MARKET APPLICATIONS HIGHLIGHTS

Phyto- pharmaceutical and cosmetic industry, fine chemical.



Technology Offers

Other

High precision positioning system for topographic monitoring

ABSTRACT

A group of researchers has developed a new highly accurate system for geo-referenced information acquisition. The system, in prototype form, is suitable for morphological monitoring and finds application in topographic surveys in geographic areas of different spatial scales, at affordable costs, with a regular frequency, and with particular relevance in littoral environments, particularly in sandy beaches. The advantages over existing solutions include efficacy, precision, fastness, higher productivity and low cost.

DESCRIPTION

Over the last decades coastal erosion and consequent coastline retreat have become a worrying reality in many littoral areas of Portugal and other similar countries, often leading to the implementation of various interventions, which require uniform and effective evaluation methodologies of morphological variations and sediment volumes quantification that in turn support decision-making processes. On the other hand, an innovative system for geo-referenced information acquisition equally benefits the realization of public and private works. This innovative system integrates GPS receptors and a laser distance sensor allows high precision topographic surveying, with application in geographical areas with different special scales (from an hectare to thousand of hectares), at affordable costs, making the establishment of regular monitoring programs feasible, at a biannual scale.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

- High precision system for morphological monitoring of littoral environments;

- High precision system for geo-referenced information acquisition with application in public and private works;
- High precision system for topographic monitoring with GPS receptors and a laser distance sensor with high cadence and precision, which enables an accurate measurement of the distance to the ground;
- High precision system for topographic monitoring, with application in geographical areas of different special scales, allowing the establishment of regular monitoring programs.

DEVELOPMENT PHASE

Field Tested

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Topographic companies; Cartographic companies; Construction companies

MARKET APPLICATIONS HIGHLIGHTS

The system is suitable for morphological monitoring and finds application in topographic surveys in geographic areas of different spatial scales, with a regular frequency.

Didactic and ludic game for mental calculus training

ABSTRACT

A researcher has developed a mathematic game, similar to the classic Minesweeper, but to be played with pen and paper and not in the computer. This game can be used as didactic material, for basic and high school students; and as ludic material, for children, teenagers, and adults. In both situations, the game has mental calculus training features. The advantages of this technology over existing ones include, precisely, the computer non-dependency; the didactic application, which, in an attractive way fosters the development and/or liking increase of mathematics learning, with or without evaluative concerns, in and outside the classroom; and the ludic application, which contributes to the increase of entertaining games, funny, and, at the same time, useful to the brain activity. The university is looking for publishers and/or companies which produce or manufacture toys and infantile and juvenile games for a joint development and licensing.

DESCRIPTION

This solution is innovative in the sense that it is a similar version to the well-known and popular game Minesweeper, but which is to be used without the computer, with the aid of pen and paper only, or as a table game. If, on the one hand, the classic game Minesweeper still has a high level of fans all over the world, on the other hand, its availability in electronic format only is limiting to the main part of the population, as far as electronic means are concerned. Besides, more and more the citizens look for new entertaining games which allow them to better manage the waiting time in rows or during public transportation. Given the amount of algorithms developed by the researcher, the game can have different difficulty levels, from the more basic to the more complex ones. The game field consists of a table with open cells, that is, with numbers.

The goal of the game is to determine, in the empty fields of the game field, where, for instance, the treasure box, in the didactic application, or where the mines, in the ludic application, are. The number in a given field is equal to the number of neighbour fields that contain treasure boxes/mines. The player shall, for instance, mark with a cross the fields where he/she believes that the treasure box/mine is, and with, for instance, a dash the fields he/she considers to be empty. At the end, the player can confirm if his/her answers are correct, through a solutions table.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

- Game which can be played with pen and paper, without a computer;
- Game which can be used as didactic material, for basic and high school students, fostering the development and/or liking increase of mathematics learning, in and outside the classroom;
- In the classroom, the students answers can be subject to the teacher's evaluation, based on a game field which is equal to each student ? what cannot be done using a computer, where the game field selection is randomly done;
- Game which can be used as ludic material, for children, teenagers and adults, increasing the variety of entertaining games, funny, and, at the same time, useful to the brain activity;
- Game with different difficulty levels.

DEVELOPMENT PHASE

Available for demonstration- tested in children (6-11 years old)

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications

- Adaptation to specific needs

IP RIGHTS

Registered trademark

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Publishers; Companies which produce or manufacture toys and infantile and juvenile games; Companies which produce didactic and ludic material.

Ohmic heating reactor for chemical synthesis

ABSTRACT

A group of researchers from 3 public universities has developed an ohmic heating reactor for chemical synthesis, particularly in aqueous media. This reactor and the heating method finds application in organic and inorganic synthesis, preparation of organometallic materials, synthesis of nanoparticles and polymers, being applicable in the chemical and pharmaceutical industry. The simplicity and low cost of the reactor, its low heat capacity and thermal inertia, the fast and uniform heating, high efficiency, easy maintenance and handling, as well as the possibility of visual monitoring of the reaction evolution and the possibility of adding reagents during the course of the reaction, make the use of this reactor a versatile and advantageous option for synthetic procedures. The Universities are seeking interest from companies devoted to develop scientific equipment or companies interested in using this technology, such as those from chemical or pharmaceutical industry.

DESCRIPTION

The present invention relates to an ohmic heating reactor and the application of this heating method in chemical synthesis, particularly in aqueous media. This method emerges as an alternative to the classical heating and microwave radiation. In the ohmic heating the reaction mixture (material to be heated), which functions as an electrical heater, is heated by passing electricity through it. The power generated depends on the applied AC voltage, the impedance and the current generated. Using a sinusoidal high frequency voltage, the time interval of electric polarization minimising the occurrence of oxidation reduction side reactions was decreased. The use of high frequency leads to the minimization of the system polarizability

leading to a higher electrical efficiency decreasing the capacitive component. The electrical energy is dissipated directly into the reactor as heat with high efficiency, resulting in fast and uniform heating (uniform temperature) and in an increase in the charged species movement. This invention is applicable, for example, in the chemical and pharmaceutical industry, particularly in synthetic procedures.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

In ohmic heating electrical energy is dissipated in heat with a very high efficiency (electrodes in contact with the reaction medium), resulting in fast and uniform heating and in the increase of charged species movement. As in the case of the heating with microwave radiation, electrical energy is transformed into thermal energy. However, on contrary of heating with microwave radiation (penetration depth of microwave radiation in absorbing media is limited) the penetration depth is virtually unlimited and the extent of heating is regulated only by the spatial uniformity of electrical conductivity throughout the reaction medium and the time spent in the ohmic reactor. Thus, the direct scaling of the ohmic heating for the pilot or industrial scale shouldn't have the limitations presented by microwave radiation heating. It is also possible to reduce reaction times and increase the energy efficiency of chemical reactions.

DEVELOPMENT PHASE

Available for demonstration (laboratory prototype)

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry: companies devoted to develop scientific equipment; companies interested in implementing this particular technology; companies from chemical and pharmaceutical industries; research institutes or academies interested in applying this technology in their research activities in particular those related to

chemical synthesis. Trading companies and / or distributors of scientific equipment.

MARKET APPLICATIONS HIGHLIGHTS

The present invention finds application in synthetic processes of chemical industry (chemicals, agrochemicals and polymers) and in synthetic processes in the pharmaceutical industry. It can also be applied to the synthesis of materials (preparation of organometallic materials and synthesis of nanoparticles).

Household garbage compactor

ABSTRACT

A research group has developed an equipment to compress and compact garbage. This equipment is especially suitable for the case of household waste with cylindrical geometry, as is the case of most domestic waste bins, being them either embedded in the kitchen or not. Manufacturers of garbage recycling and storage equipment are sought, as well as manufacturers of equipment for kitchen and other household equipment; both for cooperation agreement and licensing.

DESCRIPTION

Compression can be a response to the problem of fouling, since the major problem of waste is the transportation and storage. With the decrease in volume occupied by waste, increases the time of filling of landfills by extending their time of storage. Garbage compactors are devices capable of compressing the waste in order to reduce the volume of occupation in containers, increasing the level of hygiene and safety. This technology consists in a garbage compactor comprising an outside cylindrical support structure, that could be the waste container itself, which supports and adds the spring return position, the profiles in "T" (used as a guide), a cable winder and a motor winder. Its operation is based on the movement of grip by constriction.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

The current household garbage compactors household carry compression vertically, downwards, with punctures quadrilateral geometry. These garbage compactors occupy a large space and cannot be adapted to the bins already in the kitchens. Currently, household garbage is not compressed in most homes, too. Due to its geometrics and functionality, the present invention can be placed in any container of household waste, thus making it a universal system. This important feature translates into better use of space in the kitchen.

DEVELOPMENT PHASE

Laboratory tested.

TYPE OF COLLABORATION SOUGHT

- License Agreement
- Joint further development
- Testing of new applications
- Adaptation to specific needs

IP RIGHTS

Patent(s) applied for but not yet granted

SPECIFIC AREA OF ACTIVITY OF THE PARTNER

Industry : Garbage recycling and storage equipment manufacturers and kitchen and other household equipment manufacturers

MARKET APPLICATIONS HIGHLIGHTS

Garbage recycling and storage and kitchen and other household equipments.

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