Description

Method and apparatus for the extraction of electrical power from the water

[0001] present disclosure relates the technical field of methods and apparatuses for the extraction of electrical power from water.

[0002] A process of the prior art known to generate electrical energy from a volume of water is described in US patent application US2009/0226798. This process provides that a volume of water is brought into contact with a hydrophilic surface and said volume of water is applied by the energy, for example by radiation. This energy can be for example thermal energy or infrared coming from the outside environment. As is known, and as indicated in the aforesaid patent application, this causes the formation of a so-called "zone of exclusion" at the interface between the surface hydrophilic and the remaining part of the water, called "water bulk" or "area bulk. In the area of the water shut-off has a series of physical properties distinguishable from those of the water bulk, and this is due to the fact that the hydrophilic surface is able to modify at a physical level the organisational structure of water, in particular creating in the water of the aggregates over-molecular. As described in the above mentioned patent application, by providing two electrodes (for example platinum), respectively in the region of the exclusion and in bulk region, and by connecting between the said electrodes a load (for example a resistance), it is possible to extract electric energy from the water as it can be clearly seen from the experimental results shown always in the same patent application. These experimental results show that can be obtained an increase in the electric power extracted lowering pH of the volume of water. According to the description above mentioned patent application, U. S. The addition of a salt, such as for example potassium chloride or sodium chloride, determines a positive effect (and hence an increase) in electric power extracted, being probably a result of the increase of the conductivity of the water.

[0003] A process for the extraction of electrical energy by the water of the state of the prior art it is also described in the article *: Electricity Oxhydroelectric effect from water by Twin electrodes,* roberto germanium gas et al., Key

Engineering Materials Vol. 495 (2012), PP. 100-103. This article relates to experiments that substantially confirm the experimental results achieved by the inventor of above-mentioned patent U. In particular, in the extraction process described in the aforementioned article is provided for the volume of water is a saturated solution of potassium carbonate (K_2C0_3) in water with pH higher than 10. Also according to what described in the above article, the addition of a source of oxygen to the solution, for example, adding a small amount of hydrogen peroxide, which in practice do not change zero, the pH, causing a jump sensitive, in particular two orders of magnitude, in electric power in DC (direct current) extracted. According to the authors the above article this can be explained by the fact that the extraction of electrical power from water is mediated by oxygen molecules. For this reason, the phenomenon at the base of the above processes is called "ossidroelettrico effect.

[0004] Also known are of the nanoparticles insoluble, such as for example nanoparticles barium titanate, which in a similar way to what happens for the hydrophilic surfaces, are able to modify the structure of the water, and as such can allow the extraction of electrical power from water.

[0005] The purpose of the present invention is that of providing a novel method and alternative with respect to the methods described above with reference to the state of the prior art.

[0006] This object is achieved by means of a process for the extraction of electrical energy as defined in general in the attached claim 1.

[0007] Advantageous embodiments of the above extraction process are defined in the dependent claims.

[0008] The present description an extraction of electrical energy by the water as well as defined in claim 10 in its general form.

[0009] Further characteristics and advantages of the invention will become from the detailed description that follows, provided purely by way of non-limiting example, with reference to the accompanying drawings, in which:

-figure 1 shows schematically a flow chart of a process for the extraction of electric energy by the water;

-figure 2 schematically shows an apparatus for carrying out the process

of extraction of figure 1;

-figure 3 represents a first graph obtained by experimental measures;

-figure 4 shows a second graph obtained by experimental measures;

-figure 5 shows a third graph obtained by experimental measures; and

-figure 6 shows a fourth graph obtained by experimental measures.

[0010] With reference to figures 1 and 2, with 20 (figure 2) indicates the whole a process for the extraction of electrical energy from a volume of water 2. With the reference 1 (figure 1) on the contrary shows a non-limiting embodiment of an apparatus for implementing the method of extracting 20, comprising a container 9 adapted to contain the volume of water 2. The volume of water 2 contains distilled water, for example having an electrical conductivity of 1.2 μs/cm.

[0011] The process 20 includes a step of subdividing 21 the water volume 2, through a membrane filter 5, in a first 3 and a second 4 sub-water volume. The membrane-filter 5 defines two chambers in the container 1, respectively containing the first 3 and the second sub-volume of water 4. Preferably, the container 9 comprises two openings 11.12 and the membrane filter 5 is interposed between said openings 11.12 so that the first volume is contained between a face of the membrane 5 and one of said openings and the second space is contained between the other side of the membrane 5 and the other of said openings.

[0012] In accordance with one embodiment the membrane filter 5 is a nanometric membrane. For example, the membrane filter 5 is a nanometric membrane having holes with a maximum diameter equal to about 25 nm.

[0013] The process 20 includes a step of dipping in each of the first 3 and second 4 sub-volume of a respective electrode 7.8. Said electrodes are 7.8 for example wire electrode of platinum.

[0014] The process 20 further comprises a step of contacting 23 one of said sub-3.4 volumes of water, in the example the sub-volume volume 3 of figure 2, with a hydrophilic surface 6 or immersed in one of said sub-VOLUMES nanoparticles insoluble suitable to modify the organisational structure of water. In particular, the surface hydrophilic and the aforesaid nanoparticles are such as to determine the formation of

aggregates over-molecular 3, sub-volume thus causing an asymmetry between the sub-volume 3 and the sub-volume 4. The membrane 5 is such as to preserve the asymmetry AS while allowing the passage between the two sub-3.4 volumes of individual molecules of water prevents the passage of the aggregates over-molecular volume from the sub-3 to the sub-volume 4.

[0015] In accordance with one embodiment, the step of contact 23 comprises a step of dipping fragments 6 Nafion@ one of said sub-3.4 volumes (in the example in the sub-volume 3). As is known, these fragments 6 have a hydrophilic surface. In a alternative embodiment at least a portion of the wall of the container 9 comprises the aforesaid hydrophilic surface, for example, a portion of the inner wall of the container 9 of the chamber of the container 9 which houses the first sub-volume of water 3.

[0016] According to a further alternative embodiment, the step of contacting 23 comprises a step of dipping in one of said sub-3.4 volumes of the nanoparticles insoluble, for example nano-particles of barium titanate, or nanoparticles of other suitable material to modify the organisational structure of water in a manner similar to what occurs with the hydrophilic surfaces.

[0017] The process 20 further comprises a step of extracting 26 electric energy by the water volume by connecting a load RL, for example a resistance R1, between the aforesaid electrodes 7.8.

[0018] According to a further embodiment, the method 20 comprises a step of interrupting 25 contact with the hydrophilic surface or remove said nanoparticles before carrying out said step of extracting 26 of electric energy. In this way, the apparatus 1 can also operate as a stack adapted to restore the energy linked to the variation of the organisation of the water due to the contact with the hydrophilic surface or to the immersion of the aforesaid nanoparticles for example even after the removal of the particles hydrophilic or of the nanoparticles by the water volume.

[0019] In accordance with one embodiment, the method 20 comprises a step of adding 23 to the water volume hydrogen peroxide (H202). Preferably, said step of adding 3 is carried out both in the first 3 and the second 4

sub-volume.

[0020] From the results of experimental tests it has been confirmed that the process and the apparatus described above are able to fully achieve the intended objects.

[0021] Some of the above experimental results are shown in graphs of figures 4 to 6. The ordinate of these graphs represent voltages in volts. On the x axis indicates the time.

[0022] In particular, the said graphs of figures 4 to 6 refer to tests in which:

-a tubular container of the type shown in figure 1, therefore a tubular container C-shaped or U-shaped, has been inserted distilled water having an electrical conductivity of 1.2 μs/cm;

-a tubular half of the container has been provided a membrane filter adapted to separate 5, two sub-3.4 volumes of the volume of water;

-were immersed two electrodes 7.8 to platinum wire in the above mentioned under volumes 3.4;

-was connected to a resistance R1 of kQm 47 between the two electrodes 7.8 to platinum wire;

-was measured with a digital multimeter 15 the voltage across the resistance R1, in an initial state of the system thus obtaining the portion of graph 30 shown in figure 3;

were added about 20 fragments of Nafion with the sub-volume to the left 3, fragments being fragments square with a side of about 5 mm;

-was measured with a digital multimeter 15 the voltage across the resistor R1 and, again with reference to figure 3, was observed after a step marked 31 characterized by swinging transient stability of the voltage read as indicated by the line 32 of the graph in figure 3 (this portion corresponds to a power of about 2.6 pw);

-was added a relatively small quantity of peroxide of hydrogen (corresponding to a percentage by volume of 0.004 the volume of water) in both the two sub-volumes;

-was measured with a digital multimeter 15 the voltage across the resistor R1, and with reference to figure 4 it has been found a step 33 with respect to portion 32 of the graph in figure 3 with a stabilizing the

tension read as indicated by the line 34 of the graph in figure 4(This portion corresponds to a power of about 0.1 pw);

-was added relatively low amount of hydrogen peroxide (corresponding to a percentage by volume of 0.004 the volume of water) to both the two sub-volumes;

-was measured with a digital multimeter 15 the voltage At the ends of the resistance RL, and with reference to figure 5 it has been found a step 35 with respect to portion 34 of the graph in figure 4 with a stabilizing the tension read as indicated by the line 36 of the graph in figure 5 (this portion corresponds to a power of about 2 Uw).

[0023] All the above mentioned measures were carried out at ambient measurement. Has not been applied any energy to the water volume to the thermal energy intrinsically applied on the ambient temperature.

[0024] It can be understood therefore how the measurements relating to the section 36 of Figure 5 refer to values higher than about six orders of magnitude than the initial relative measurements to the tract 32 of figure 3.

[0025] Lastly, in figure 6, is a plot that, starting from the portion 36 of the graph in figure 5 shows that the extraction of the current persevera for a few days (3/4) until it is aligned to the initial value corresponding to the length 32 figure 3.

[0026] Without prejudice to the principle of the invention, the forms of embodiment and details of construction may be varied widely with respect to what has been described and illustrated purely by way of non-limiting example, without thereby departing from the scope of protection of the invention as defined in the appended claims.