Membraneless fuel cell
for direct obtaining of electrical power, as a permanent and alternating current from the electrochemical reactions, including bioelectric processes.

Goal of the project: develop and implement high-energy power plants for various purposes that can operate with electrolytes of any origin, on the basis of an improved method for direct production of electricity using membraneless fuel cells.

Description

The method and apparatus for direct obtaining of electric power from the energy of the fuel oxidation reaction in a stream of an oxidizer are well-known, the core principle of this method is creation of conditions for oxidizing fuel by an oxidizer in order to generate a flow of positive and negative charges, and for their subsequent separation and parting onto anode and cathode using one-way ion-exchange membranes. Connection of the electrodes to an external electric circuit provides generation of direct electric current.

The disadvantage of this method is that separation of positive and negative charges is effected by using ion-exchange membranes. They are the most expensive elements in the construction of a fuel cell, as well as very fragile (short-lived). Moreover, the physics of these elements is not studied enough so far, which leads to technological complexity and hinders a widespread industrial use of fuel cells. Another disadvantage of this method is the impossibility of changing the direction of electric current in the external circuit, which results in inability to create a source of alternating current.

Novelty

We have improved the well-known method and device, which allowed us to produce electric energy of direct or alternating current. To achieve this goal:
1. We removed a one-sided conductive membrane;
2. We installed a magnetic or electric field into the cell, which resulted in separation of positively and negatively charged particles onto the anode and cathode of the cell under the influence of forces generated by the motion of charges in these fields.

The main advantages

The proposed solution makes it possible to:
• Simplify the design, increase the reliability of fuel cells and significantly reduce the price of their production (by removal of ion-exchange membranes from the construction).
• Add new properties to fuel cells – they will be able to generate both permanent and alternating electric current (by introduction of new elements that control the flow of the charges into FC design)
• Standardize the production of fuel cells that will be able to operate on different electrolytes with an efficiency of over 60%.
• The proposed method of separation is applicable for all types of fuels, in all electrolytes, etc....

Stage of Development

• The membraneless fuel cell to run on alcohol has been produced and tested in laboratory conditions. The prototype is ready for pilot designing in two versions.
• The membraneless biofuel cell has been produced and tested in laboratory conditions. The prototype is ready for pilot designing in two versions.
• Two patent applications have been filed.

Implementation plan

First stage (12 month)
1. Gathering and preparation of creative team.
2. Development of the device’s main construction.
4. Assembling and testing of fabricated samples.
5. Marketing.
6. Organizational work.

Second stage (12 month)
1. Decision-making on the production of fuel cells.
2. Purchasing of materials and equipment.
3. Development of production line and launch of fuel cells manufacture.
4. Assembling and testing of fabricated samples.
5. Work of Technical Control Department.

Contact Information
Kyselov Vladislav, Ph. D. - director of The Scientific & Technical Centre “Plus Radio”
Address: 50, Kharkivsky Shosse. Kiev, 02160, Ukraine.
E-mail: kyp@i.com.ua Tel. (38044) 5597011; mob : (38067)7980194.