

The State-private partnership experience: development of the technology, elaboration of a structure and arranging of manufacturing capabilities for hydrogen-aerial portable fuel cells

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Basing of the state-private cooperation (the interconnected work program and joint financing) Hydrogen-Aerial Portable Fuel Cells (PFC) were developed during 2004–2006. These fuel cells with gradient-porous nanostructures of 2 Wt and 25 Wt power are meant for mobile phones and laptops charging devices.

The nanostructure gradient-porous PFC are elaborated to recharge portable electronics (mobile phones, digital cameras, MP3-players, field portable radio transmitters, laptops). This so to say a "pocket outlet" is in full operation even when the electricity or autonomous power generators are not available. The PFC can be used in everyday life of various strata of society, in field operation and in extraordinary/emergency situations as well.

The process technology has already been developed; on the manufacturing areas of JSC "Instrument plant "Tensor"—the industrial partner, the domestic manufacturing capabilities are arranged to perform serial output of Hydrogen-Aerial PFCs, charging devices.

From matrix gradient-porous nanostructures based on the Trumem® membranes, portable hydrogen-aerial fuel cells with the unique membrane-electrode unit are developed. This kind of unit – the narrowest multi-layer element combines features of gas-distributing and gas-diffusion layers, of a current collector, of an electrolytic membrane support and of an electrocatalyst carrier in the matrix.

The matrix gradient-porous nanostructures permit to create the PFC membrane-electrode unit in an indivisible solid-state matrix and avoid difficult assembly procedures so typical for the modern hybrid fuel cell technology (CMR). The new PFC construction is intended to solve the problem of ultraminiaturization in the micro power engineering with help of high components compactness and high density of electrochemical power as a result. The nanotechnology and nanomaterials for the hydrogen industry provide a breakthrough in the micro power engineering which had a similar impact as the integration of very-large-scale integration circuits in the microelectronics.

This patent product has no domestic or foreign analogues.

Performance attributes of the PFC are:

- Nominal capacity — 2Wt and 25 Wt
- High power density — 190 mWt/sm²
- Continuous functioning time is no less than 10 hours.

The accumulated experience of the portable fuel cells manufacture arranging and well-qualified personnel training will provide successful realization of the project for development and arranging of charging devices (with abilities ensuring laptops and analogue electronic devices operation) serial output started together with Medis

Technologies company (USA).