

Scientific research efforts and specialists education in institute of energy efficiency solutions of MPEI (TU)

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The use of hydrogen as an energy carrier is one of the cardinal ways to solve ecological problems of modern power engineering. Hydrogen energy development takes place among the prior trends in Russia. Therefore the requirement for experts on hydrogen energy increased and in the long term even more will increase [1].

Institute of Energy Efficiency Solutions (IEES) of Moscow Power Engineering Institute (TU) is a key center of specialists education and research efforts in the field of hydrogen energy. Institute of Energy Efficiency Solutions possesses highly skilled lectures, scientific researchers and enlists many outstanding scientists and specialists from big research centers to train new specialists [2].

At the Institute of Energy Efficiency Solutions the center on hydrogen energy "Hydrogen Energy and Electrochemical Technologies" is opened. The center has its own modern equipment, new scientific and test devices. Material and technical basis of the center is in constant developing, for example for the last year the newest test stations has been purchased.

Some chairs and science departments of the Institute of Energy Efficiency Solutions of MPEI (TU) takes part in fulfillment of SRDT (D&T) works of Russian Foundation for Basic Research, scientific programs of Ministry of Education of the Russian Federation and Ministry of Science of the Russian Federation, and also under economic contracts.

At the present time the next contracts are carried out:

State contracts with RosScience:

- Research and development of technologies of creation of new generation elemental base and membrane-electrode units for low temperature water electrolyzers and fuel cells
- Scientific-research efforts and development of reversible electrochemical system with polymer-electrolyte membranes, carrying out in the framework of international cooperation with the countries of European Union
- Research and development of solid state hydrogen storage and purification systems

Russian Foundation for Basic Research:

- Development of electrode-diaphragm blocks for alkali electrolysis on the base of new composition polymeric diaphragms and catalytically active electrodes
- Research of kinetics and mechanism of biocatalytic reduction of inorganic and organic hydroperoxides on nanostructured composite materials: enzyme conducting polymeric-carbon carrier and others

Economic contracts:

- RSC "Kurchatov Institute"—"Research and development of high efficient electrolytic systems with PEM"
- PC "UralChimMash"—"Development of alkali water electrolyzers"
- NAVE – "Determination of effect of hydrogen addition to the traditional fuel"

engines on technical and economical characteristics of automobile and others.

A number of research works is finished with introduction in the industry.

In 2007 MPEI held International Symposium on hydrogen energy. Student's and new scientist's section functioned within the bounds of the symposium. Federal Agency on a Science and Innovations, MPEI (TU), and firm "Hydrogenics" (Belgium). The symposium passed under aegis of IPHE.

Foreign and domestic hydrogen equipment manufacturers, such as Hydrogenics Co (Belgium-Canada), Teledyne Energy Systems (USA), Ural Electrochemical Factory, PC "UralChimMash", National Investment Company "New Energy Projects" (Russian Federation) and etc., have accepted active participation in symposium. Except for the leading Russian scientists (Academicians of RAS A. U. Tsevadze, N. N. Ponomarev-Stepnoj, A. S. Koroteev), researchers from Germany, USA, South Africa, Canada, Belgium, Norway, Ukraine and Belarus has taken part in symposium.

Educational-Research Center of MPEI (TU) – RSC "Kurchatov Institute" is successfully operated within last 5 years. Scientific and educational programs are carried out within the frames of the Center.

More than 350 specialists on hydrogen and electrochemical energy are graduated at the Institute of Energy Efficiency Solutions of MPEI (TU) by present time. Five graduates defended Theses for a Doctor's degree, more than 50 – became Candidate of science, many graduates became heads of chairs, plants and subdivisions of institutes and plants.

Education of specialists on hydrogen energy in MPEI (TU) is organized on the base of the following main principles: deep fundamental knowledge; system approach to the education of engineers; involving students in research efforts, including imperative participation in educational research efforts; own student's efforts under the direction of lecturers, high scientific and professional level of the teaching staff. MPEI (TU) specialists published about 30 scientific books and educational supplies, using now for training of the specialists on hydrogen energy [3–8].

Annually students presents 10 to 15 scientific reports at the International and Russian scientific conferences. Many scientific works of students on hydrogen energy have been marked by diplomas and letters. Close relation of the chair with institutes of the Russian Academy of Science, the State centers of science and with the industrial enterprises promotes to a great extent increasing level of graduated specialists on hydrogen energy.

Referenses

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