Objectives

The main objective of the CEPHOMA Centre is to promote closer cooperation of scientists from Poland, Newly Associated States and EU countries, active in the field of photovoltaics and physics of materials for novel energy sources. These areas belong to the most prospective fields in solid state physics and engineering.

Important aspect of the Centre activity is its networking to leading EU research institutions within European Research Area (ERA).

The proposed activities aim at adjusting capabilities of the Centre to meet the highest research standards and to enable joining projects within the 6th Framework Programme of the European Union.

Very important goal of the Centre is training of PhD students and young scientists in Centre’s as well as partners’ laboratories.

Challenges

CEPHOMA activity is concentrated on topics closely related to novel materials used in energy conversion and storage devices. Two main pillars of that activity are: photovoltaics (conversion of solar energy to electricity) and solid state ionics (conversion of chemical energy to electrical one or vice versa).

Photovoltaic compounds developed and studied in the Centre are (CuInSe₂) and Cu(In,Ga)Se₂. The investigation of these materials includes their characterisation by optical methods and advanced junction techniques.

Among materials of special interest developed for solid state ionics are: lithium, oxygen and proton conductors and materials exhibiting mixed electronic-ionic conductivity. Purely ionic conductors are used as solid electrolytes in advanced lithium batteries, fuel cells, gas sensors, oxygen pumps and electrolysers. Mixed electronic-ionic conductors are applied as cathode materials in novel batteries and electrochromic devices. The investigation in solid state ionics includes impedance spectroscopy, X-ray diffractometry (XRD), differential scanning calorimetry (DSC) and X-ray absorption techniques - XANES / EXAFS.

Project structure

CEPHOMA stands for Centre for Photonics and Materials for Prospective Applications. Its program is divided into 7 workpackages:

WP1: Training of young scientists
WP2: Photovoltaic links
WP3: XVII School of Opto-electronics on “Photovoltaics – Solar Cells and Detectors”
WP4: Improvement of cooperation in solid state ionics
WP5: Strengthening of cooperation in the area of oxide ion conductors
WP6: Impedance spectroscopy workshop and training of young scientists
WP7: Co-ordination of the Centre activities

Work-package WP1 is intended to promote international European exchange of young promising scientists and PhD students.

Work-packages WP2 and WP3 are directly related to the field of photovoltaics.

Three work-packages: WP4, WP5 and WP6 focus on tightening international European research collaboration on solid electrolyte and electrode materials for applications in batteries and fuel cells.

Progress of the CEPHOMA program is monitored by the International Advisory Board.
Progress to date

(January - October 2003)

In the period of interest the activity of the CEPHOMA Centre has progressed according to the approved plans.

In February 2003 a first Meeting of the International Advisory Board of the Centre took place in Warsaw.

In the area directly related to photovoltaics, intensive preparations are going on for the XVII School of Optoelectronics on “Photovoltaics – Solar Cells and Detectors” (WP3). It is organized in October 12-16, 2003 in Kazimierz, a beautiful small town in Poland.

To date there have been several visits of Polish PhD students to European research centers to perform experiments (London, Lille, Brussels).

There were also exchange visits of senior scientists initiating or continuing cooperation in the areas of mutual interests (visits from London and Lille, and visits to Trento, Vienna and Paris).

Scientists and students of the Centre presented their results at international conferences: ISES Solar World Congress, June 2003, Goeteborg and XAFS12, June 2003, Malmoe.

Important event organized by CEPHOMA Centre is the International Workshop on “Impedance Spectroscopy for Characterization of Materials and Structures” (WP6: Warsaw University of Technology, 24-28 September 2003). It is oriented towards application of impedance spectroscopy methods to characterization of solid electrolytes, fuel cells, batteries and solar cells. Further information:

http://www.imspe.if.pw.edu.pl

INFORMATION

Contract: ENK5-CT-2002-80666
Title: Centre for Photonics and Materials for Prospective Applications
Acronym: CEPHOMA
Address: CEPHOMA Centre at Faculty of Physics Warsaw University of Technology Koszykowa 75 00-662 Warszawa, POLAND
Duration: 36 months
Contact person: Prof. Jerzy Garbarczyk (co-ordinator of CEPHOMA Centre) tel.: +48 22 660-7267 fax.: +48 22 628-2171 e-mail: centrum@if.pw.edu.pl
Status: first year of activity