

Proceedings of the 8th International Conference  
Ion Implantation and Other Applications of Ions and Electrons

Kazimierz Dolny, Poland, June 14–17, 2010

*Editors of the Proceedings:*

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WARSAW

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## Preface

This volume of *Acta Physica Polonica A* contains the proceedings of the VIIIth International Conference on Ion Implantation and Other Applications of Ions and Electrons — ION 2010, which was held in Kazimierz Dolny, Poland, June 14–17, 2010. The Conference was organized by the Maria Curie-Skłodowska University, Lublin in cooperation with the Universities of Technology of Lublin and Wrocław.

The ION 2010 Conference, the eighth of a series of biennial ION meetings, continued the exchange of information among the international community of scientists working mostly in the field of ion beam and plasma applications. A wide range of topics were addressed during the ION 2010 Conference including:

- ion and electron beam interaction with solids and accompanying phenomena,
- formation, modification and characterization of semiconductor, metal, and polymer subsurface layers with ion beam assistance,
- plasma processing of materials,
- new developments in ion and electron techniques,
- mass spectrometry and its applications.

The ION 2010 conference was attended by more than 100 people mostly from European countries, but also from such distant destinations as Mexico or Taiwan. During four days of plenary sessions 16 invited talks and 24 communications have been given reviewing most of the actual topics. Approximately 100 contributions were presented as posters that focused on specific advances in this area of research.

The competition for the best presentations of young scientists was carried out during the ION 2010 conference. The *ex aequo* winners in the category of oral contributions were: Mr. Jan Lehmann from Rossendorf Institute of Ion Beam Physics and Dr. Sławomir Prucnal from Maria Curie-Skłodowska University, Lublin. The prize for poster presentation went to Ms. Renata Ratajczak from the Sołtan Institute of Nuclear Studies, Świerk.

We would like to thank the referees for their efforts to ensure scientific quality of the papers presented in this volume. Special thanks are due to all those who have contributed to the organization of the ION 2010 Conference.

Distinguished physicist Professor Jerzy Piekoszewski unexpectedly left us in Kazimierz Dolny one day after delivering his ION 2010 invited talk. He was a member of the International Scientific Committee for all ION Conferences. Professor Piekoszewski has been always a strong supporter of the idea of ION Conferences in scientific community. This volume of *Acta Physica Polonica A* is our tribute to his memory.

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**In memory of Professor Jerzy Piekoszewski  
– a scientist, a personality and a patriot**

Prof. dr. hab. Jerzy Piekoszewski, an eminent physicist, honest person and our friend died suddenly on 15-th of June 2010 during a scientific conference in Kazimierz upon Wisła. For over half of the century he was associated with the Atomic Energy Establishment at Świerk. He was an author of a long series of scientific papers devoted to the properties of semiconductors, recoilless emission and absorption of gamma rays, photovoltaic effects, the effects of radiation on solids, ion implantation and peculiar forms of superconductivity.

He was a person of a rich internal life, a keen researcher responsible for new generations of solid state physics students and a man of hard facts, who always searched for implementation of his scientific research.

Jerzy Piekoszewski graduated in 1956 from the Physics Department of Poznań University being a student of such master of Polish science as Professor Arkadiusz Piekara. In 1957 he started his carrier in the Solid State Physics Department of the Institute of Nuclear Research at Świerk. He served for a number of years as a head of the Semiconductor Detector Department and later as a head of the Material Modification Department at the Institute for Nuclear Studies. From 1995 he was additionally employed as a staff member of the Institute of Chemistry and Nuclear Technology. In 1970 he was granted the Ph.D degree and in 1977 the D. Sci. degree. In recognition of scientific achievements the President of Poland awarded him a title of professor.

Professor Jerzy Piekoszewski published over 150 scientific papers. He is a co-author of 6 patents. He supervised 4 M. Sci. dissertations and 3 Ph.D dissertations.

It is difficult to summarize shortly a rich course of his achievements as a scientist and an inventor and the list given below is of necessity incomplete.

In years 1958-1962 he started with a series of papers on radiation damage in semiconductors irradiated with fast neutrons from the EWA reactor at Świerk using minority carrier lifetime method.

In 1965, on return from scholarship at Ecole Normale Supérieure in France and following the advice of prof. Bronisław Buras he undertook the work in recently discovered Mossbauer effect. He constructed innovatory at that time spectrometer for the effect registration and contributed enormously to further improving this equipment. The instrument

was exploited at Świerk and provided important data on hyperfine structure of internal fields in numerous materials, especially in magnetic systems. The equipment has found a number of applications, among others in non-destructive testing of steel corrosion, in car industry and carbide phase transformations in steel vessels in power plants

The unique research carried in cooperation with the Institute of Energetics on carbide phase transformations in steel vessels after many years (tens) operation in power installations is particularly remarkable.

The construction of industrial installation for  $\text{SO}_2$  and  $\text{NO}_x$  removal from flue gases in Pomorzany power plant inclined Professor Piekoszewski to initiation of a research on increasing endurance and corrosion resistance of titanium foils used in industrial electron accelerators. Next, he developed a unique concept of eliminating post-implantation defects in silicon carbide with the use of electron beam. His idea allowed for tight cooperation with the Institute of Electronic Material Technology on SiC substrates for semiconductor devices.

In 1976 Prof. Joseph Loferski, a great enthusiast of exploiting photovoltaic solar cells in power systems, came to Poland for his one-year sabbatical leave. Prof. Piekoszewski got interested in this subject and proposed an original, low-cost approach to forming large area silicon surfaces using a plasma torch. To develop this method he joined Brown University in Providence RI (USA) where he worked for two years.

On return to Poland Prof. Piekoszewski continued the interest in photovoltaic cells using new methods available at Świerk. The application of the equipment for generation of short plasma pulses designed by Dr. Michał Gryziński in the Plasma Physics Department of the Institute for Nuclear Studies appeared to be a far-sighted and fruitful idea.

Throughout the next years Prof. Jerzy Piekoszewski became a leader in studying the solid surfaces. He became well known as a specialist in alloying surface layers with foreign atoms using pulsed plasma beams. It is worthwhile to mention the research on modification of the surface properties of steel – an improvement of tribological and corrosion properties. The recent research concentrated on modification of steel surface with rare earth elements.

Professor Piekoszewski died suddenly during the VIII-th International Conference on Ion Implantation and Other Applications of Ions and Electrons, which he organized in cooperation with the Physics Department of the Maria Skłodowska-Curie University in Lublin and in which he presented papers created with his contribution. He died as he has lived – in action and with good will in mind.

We part with a person which we will miss very much. We admired not only his knowledge and professional skill in evaluating physical matters and phenomena but also his highbrow openness to the problems of contemporary world and his will to contribute to his Country. He was a sincere Polish patriot – his intention was to make Świerk a leading scientific establishment for modifying the material properties in the world-wide dimension. It is his great last will. We, friends and colleagues part with him with a deep regret and we shall never forget him.

Andrzej Czachor, IEA, Świerk  
Lech Waliś, IChTJ, Warszawa  
Zbigniew Werner, IPJ, Świerk