

**Proceedings of the
Professor Stefan Mróz Symposium**
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organized by the
Institute of Experimental Physics
of the University of Wrocław



Editors of the Proceedings

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Preface

In the year 2008 Professor Stefan Mróz, the well-recognized physicist, celebrated his 70th birthday. In order to appreciate his outstanding contribution to surface science, and acknowledge his work for the academic community, the Institute of Experimental Physics of the University of Wrocław organized (May 16–17, 2008) a special symposium (www.symposium.ifd.uni.wroc.pl). This two-day scientific meeting held in Wrocław consisted of 11 invited lectures of outstanding scientists, 6 oral presentations and 21 poster contributions of researchers. Sixty scientists from 8 countries attended the symposium. The lectures were delivered by: Professor Antoni Bukaluk (Bydgoszcz), Professor Ryszard Duś (Warsaw), Professor György Gergely (Budapest), Professor Bernard Gruzza (Clermont-Ferrand), Professor Aleksander Jabłoński (Warsaw), Professor Maria Janik-Czachor (Warsaw), Professor Leszek Jurczyszyn (Wrocław), Professor Bronisław Orłowski (Warsaw), Professor Igor Pronin (St. Petersburg), Professor Klaus Wandelt (Bonn), and Professor Iona Zasada (Łódź). The meeting provided both an overview of the electron spectroscopy methods used for the solid state surface characterization and advances in this area. We would like to thank all the participants of this meeting for their contributions and for creating a very friendly and stimulating scientific atmosphere.

This special issue of the *Acta Physica Polonica A* contains 5 invited and 7 contributed papers presented at “Professor Stefan Mróz Symposium”. All of them have undergone the regular review procedure. We would like to express our gratitude to all the referees for their efforts to review and improve the manuscripts.

About Professor Stefan Mróz



Since the beginning of his career (1960) Professor Stefan Mróz has been dealing with surface science. During his doctoral research, under the supervision of Professor Jan Nikliborc, he constructed a glass reverse view low energy electron diffraction (LEED) apparatus (1967) and with the use of this equipment he performed investigations of thermal vibrations of atoms on the Ni(001) surface. After being conferred his Ph.D. (1969), Professor Mróz in collaboration with Dr. Stanisław Kaszczyszyn developed an experimental setup in order to make the chemical analysis of solid surfaces possible with the use of the Auger electron spectroscopy (AES) and in this way extended its utility. Both methods, LEED and AES, were implemented by Professor Mróz for the first time in Poland. Professor Mróz continued the investigations of thermal vibrations together with Dr. Alicja Mróz and Dr. Andrzej Grudniewski, and also performed experiments concerning the sulphur segregation on metal surfaces.

After his habilitation (1976), Professor Mróz's attention turned to structural investigations of ultrathin epitaxial metal layers on substrates. Together with his co-workers he developed novel applications of the Auger electron spectroscopy and elastic peak electron spectroscopy for the determination of parameters crucial for a quantitative Auger analysis, such as the inelastic mean free path of electrons in solids and the backscattering factor in the Auger electron emission. In 1987 he became a professor. Based on the results obtained together with Dr. Alicja Mróz he indicated the possibility of using the crystalline effects in the Auger electron spectroscopy to determine the structure of ultrathin layers. As a consequence, he developed together with Dr. Marek Nowicki the directional Auger (DAES) and directional elastic peak electron spectroscopies (DEPES). These new experimental methods made it possible to find the crystalline structure of epitaxial layers with the use of a very simple and inexpensive apparatus. Recent applications of DAES and DEPES worked out by Professor Mróz and his Ph.D. students have proved the usefulness of these methods in the determination of the composition, crystalline structure, and structural changes in the surface layers of metal alloy crystals.

The most important scientific achievements of Professor Stefan Mróz are:

- Experimental determination of the thermal vibration amplitude of surface atoms on different nickel crystal surfaces and the determination of the vibration anisotropy;
- Determination of inelastic mean free path values and backscattering factors for Au, Ag, and Cu;
- Elaboration of the physical principles of DAES and DEPES;
- Investigation of the growth mechanism and the crystalline structure of metal layers on metal substrates at different temperatures.

The most important achievements of Professor Stefan Mróz concerning the development of electron spectroscopy methods are:

- Construction of the glass reverse view LEED apparatus;
- Development and application of an alternating current method of measuring the diffracted beam intensity in LEED;
- Elaboration of a simplified quantitative Auger analysis method;
- Application of a simplified version of the DEPES method to determine the composition of the first few atomic layers of $\text{Cu}_3\text{Au}(001)$.

The results of investigations conducted by Professor Stefan Mróz and his collaborators were presented in 103 publications. Seventy four works were published in international scientific journals. Moreover, Professor Stefan Mróz published three books and five popularizing works. He is also a co-author of three patents. Professor Mróz was bestowed two individual and one joint Award of the Polish Minister of Science and Higher Education (1970, 1977, 1989), the Gold Medal of the University of Wrocław (2008), and a number of awards of the Rector of the University of Wrocław. He is a member of the Polish Physical Society. From 1993 till 1999 he was a member of the Physics Committee of the Polish Academy of Sciences. Professor Stefan Mróz was a guest co-editor of international scientific journals such as *Surface Science* (1988, 1989, 1991) and *Vacuum* (1994). He supervised about 60 M.Sc. and 9 Ph.D. theses. Two of his Ph.D. students were habilitated and one of them became a professor.

Professor Stefan Mróz collaborated closely with the following scientists:

- Professor Ernst Bauer from the Institute of Physics of the Technical University of Clausthal in Germany (1984–1993);
- Dr. V. Fritzsche from the Physics Institute of the Technical University of Dresden in Germany (1988–1990);
- Professor Bernard Gruzza from the Blaise Pascal University in Clermont-Ferrand in France (1990–1997).

During his scientific career Professor Stefan Mróz was: vice-director of the Institute (1978–87), head of the Electron Spectroscopy Department (1981–2007), director of the Institute (1987–91), and dean of the Faculty of Physics and Astronomy (1996–2002) of the University of Wrocław. Furthermore, he worked also in the Technical University in Kielce (1980–81), the Pedagogical University of Częstochowa (1985), and was the director of the Physics Institute of the Pedagogical University in Kielce (1985–86).

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Participants of the “Professor Stefan Mróz Symposium”

