Foreword

The Second International School on Mechanical Spectroscopy MS-2 was presented in Kraków, in December 2000. The MS-2 School was sponsored by the Polish State Committee for Scientific Research (KBN) in cooperation with University of Mining and Metallurgy, Kraków, Poland. The MS-2 School was the second of a series: "MS-1, Mechanical Spectroscopy" which took place in Kraków on 7 - 14 September 1991 and "MS-2, Mechanical Spectroscopy 2000" organized in Kraków - Krynica on 3 - 8 December 2000.

This volume is dedicated to the memory of my teacher, and friend, professor Stanisław Gorczyca, doctor honoris causa of the University of Mining and Metallurgy. On 10 June 2000 he celebrated his 75th birthday. For many years previously he had been expressing his continuos interest in my work on mechanical spectroscopy, for which I am deeply grateful to him. He was expected to join us at the International School MS-2 in December 2000. Unfortunately on 16th October 2000, Professor Stanisław Gorczyca passed away. A tribute dedicated to his memory was published in Metallurgy and Foundry Engineering, vol. 26 (2000). As an homage to his many contributions to the field of physical metallurgy and transmission electron microscopy, I would like to dedicate this volume to Professor Stanisław Gorczyca.

Overview

The Second International School on Mechanical Spectroscopy MS-2 was presented in Kraków - Krynica, Poland, 3-8 December 2000. The MS-2 School was sponsored by the Polish State Committee for Scientific Research (KBN) in cooperation with University of Mining and Metallurgy (Akademia Górniczo-Hutnicza, AGH), Kraków, Poland. The MS-2 School was the second of a series: 'MS-1 Mechanical Spectroscopy' which took place in Kraków - Raba Niżna in September 1991 and 'MS-2 Mechanical Spectroscopy – 2000' organised in December 2000. More than 55 participants, representing 9 countries, participated in this School. The main aim of this School was to provide a forum for unlimited discussions with distinguished lecturers both on the very basic and advanced level. Such an opportunity is not usually provided by large International Conferences. Eleven invited lectures were presented with no intention to cover all topics in the field.

An exhibition of carefully selected and very recent ultrasonic instruments, an impulsed mechanical spectrometer, various optical and video-optical high resolution microscopes, *etc* was also organised to enable easy access of participants to scientific instruments of recent generation. Today, instrument manufacturers are offering a variety of mechanical spectrometers and separate electronic set-ups for many apparatuses operating in the kHz and MHz region. More recently a very low frequency subresonant mechanical spectrometer also became available. Therefore there is no longer a need to build up an electronic part of an instrument on one's own in a laboratory. We thought that a link between producers of modern instruments and young researches is important. That is why an exhibition of modern equipment was organised.

Why another book on Mechanical Spectroscopy? – to bridge the gap between internal friction and spectroscopic approach to dissipation of mechanical energy, and to do it in a language that people of different backgrounds can understand.

Part I introduces the concept of mechanical spectroscopy on a basic level. This approach, based on the linear response theory in the framework of the fluctuation-dissipation theorem is presented in Chapter One (L. B. Magalas). This approach springs from a lecture cycle, which the author gave in 1990 at Ecole Polytechnique Fédérale de Lausanne in Switzerland and at the First International School on Mechanical Spectroscopy MS-1 in 1991 in Poland. Chapter Two provides a list of recommended books and an exhaustive list of the proceedings from international conferences (ICIFUAS and ECIFUAS), international schools and symposia (L. B. Magalas). A comparison between mechanical spectroscopy and other spectroscopic techniques is discussed in Chapter Three (S. Etienne *et al.*). Chapter Four contains a description of mechanical relaxations in metallic glasses (V. A. Khonik) while Chapter Five covers relaxation phenomena caused by interstitial solute atoms in metals (H. Numakura). The interations between solute atoms in metals is reviewed in Chapter Six (M. S. Blanter *et al.*). The succeeding chapters from Chapter Seven to Chapter Ten provide a comprehensive overview of various effects induced by dislocations. Chapter Seven provides an extensive review on interactive computer simulation of dislocation mechanical loss spectra induced by intrinsic mechanisms and by the interaction of dislocations with foreign interstitial atoms in metals (T. O. Ogurtani *et al.*). Lecturers from Russia presented loosely organised overviews on other dislocation phenomena such as dislocation-induced amplitude-dependent effects (Chapter Eight by S. P. Nikanorov), grain boundary relaxation (Chapter Nine by V. M. Darinskii *et al.*), and acousto-optical effects in wide band gap semiconductors (Chapter Ten by B. K. Kardashev). Due to considerable interest in the practical aspects of how to

measure precisely the logarithmic decrement this topic is discussed in Chapter Eleven (L. B. Magalas *et al.*).

Part II contains several contributed papers presented at the MS-2. The Session Chairmen encouraged questions and discussion as an integral part of each contributed talk. The Panel Discussion, moderated by the Chairman and invited lecturers, formed the closing stage of the Second International School on Mechanical Spectroscopy, MS-2.

I would like to thank our sponsors who helped us to organise the MS-2 School and covered the expenses of young participants such as PhD students, young researchers and beginners. A financial support received from Polish and French industry, and Vibran Technologies Inc. (USA) is gratefully acknowledged. I also express my gratitude to the anonymous reviewers for their time and comments. As a strict policy of the Schools on Mechanical Spectroscopy (MS-1 and MS-2), invited lectures and contributed papers were reviewed by two or three reviewers. I would also like to thank Dr. T. Malinowski for his help in reformatting the papers published in this volume.

In the foreseeable future, we are already planning to organise the next school, MS-3 'Applications of Mechanical Spectroscopy'. If so, it will be organised on a similar basis as the MS-2, that is, a School with unlimited time for discussions, excursions, round table discussions followed by exciting evening activities and a Panel Discussion.

A copy of the poster from the International Schools on Mechanical Spectroscopy representing the famous painting of Leonardo da Vinci, Lady with the Ermine – ca. 1490 is reproduced in this volume with kind permission of The Princes Czartoryski Museum Foundation in Kraków, Poland (Fundacja Książąt Czartoryskich przy Muzeum Narodowym w Krakowie, ul. Św. Jana 19, 31-017 Kraków).

Finally, the success of this book is ultimately determined by the contributions contained therein. To those of you who invested a great deal of effort in preparing these excellent papers, we are truly grateful.

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