# PREFACE

The volumes contain the contributions presented at the DIMAT 2004, the Sixth International Conference on Diffusion in Materials, held in Cracow, under the Patronage of the AGH University of Science and Technology, Institute of Metallurgy and Materials Science of the Polish Academy of Sciences and the Cracow University of Technology.

150 years have passed since A. Fick proposed the diffusion equations known as Fick's laws, 115 years since Nernst and Planck formulated generalized flux equation and 100 years since the publication of A. Einstein theory of random walks. Nowadays diffusion is omnipresent in science, particularly in materials science and materials processing. Contemporary diffusion poses the fundamental problems in the area of pure science, and has strong links with modern technology. It spreads over wide areas of our knowledge from nanotechnology, physical chemistry, biology, medicine to geophysics. Hence, any conclusions deduced in the framework of diffusion, are likely to have a value for other fields. Despite the vast amount of research, it is surprising how rough the models developed for technological processes are. A classical example of that is the negligence of stresses and of the flux coupling terms in the phenomenological equations.

DIMAT conferences undergo a continuous evolution. In the first two events which were organized by Prof. D. Beke in Hungary in 1982 and in 1988, the largest part, nearly 70 % was devoted to diffusion coefficient measurements. In Kyoto in 1992 (Prof. M. Koiwa) and in Münster in 1996 (Prof. H. Mehrer) this part decreased below 30% while contributions related to complex processes grew up to 20%. In Paris in 2000 Professors Y. Limoge and J. L. Bocquet inspired further evolution of the distribution of topics.

The universalism of diffusion was one of the main points in designing the program of the conference and we tried to boost up the participation of Scientists involved in diffusion controlled complex phenomena ranging from nanotechnology (9% of all presentations), electronics (5%), surface treatments (15%) to geology. Important contributions were in the area of fundamentals (17%), reactive diffusion (10%), corrosion (7%), diffusion controlled processes (10%) and in the area of so called "ab-initio" methods. They allow to calculate the static and dynamic defect and diffusion properties of which not many years ago only a few could be deduced. Thus, DIMAT 2004 continued the evolution of the distribution of topics and the participation (the number of contributions in parenthesis), 260 (331) participants from 30 countries gathered in Cracow among which 4 never participated in former DIMAT meetings: 63 (42) from Poland, 47 (56) from Germany, 29 (37) from France, 19 (20) Japan, 15 (36) Russia, 13 (24) Ukraine, 10 (8) Hungary, 64 (108) other countries. These numbers mark a nearly steady number of participants. The same trend can be observed in the contributions, 63 invited talks, 104 oral presentations and 164 posters presented. These figures decreased for the present volumes that contain 27 invited and 164 contributed articles.

In order to attract young participants Summer School on Mass and Charge Transport in Materials was organized by the Institute of Metallurgy and Materials Science of the Polish Academy of Sciences within 5th European Framework Program. The School gathered 53 participants, 32 from the host country and 21 from 10 other European countries. They presented 18 oral presentations during the Young Scientist Session and 34 posters.

DIMAT'2004 was successful thanks to the efforts and help of many people: participants themselves and the members of the International Advisory Board who gave a lot of important suggestions. All contributed papers were peer reviewed. We thank warmly all those who helped us in chairing the sessions and reviewing the contributions. We acknowledge the financial support from the State Committee for Scientific Research, Polish Materials Society and the European Commission in the framework of the Specific Programme: "Structuring the European Research Area "; Activity: Human Resources and Mobility (HRM) Activities, Marie Curie Conferences & Training Courses SCF/LCF Contract No MLCF-CT-2003-503736.

Last but not least, the event would not have taken place without significant activity of all the members of the Local Organizing Committee as well as students from the AGH University of Science and Technology, Institute of Metallurgy and Materials Science of the Polish Academy of Sciences, the Cracow University of Technology and the Jagiellonian University in Cracow.

We are glad to announce that DIMAT 2008 conference will be organized by Professor

F.J.P. Trujillo from the University of Madrid.

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