ic-cmtp4

The 4th International Conference on Competitive Materials and Technology Processes

BOOK OF ABSTRACTS

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Edited by
László A. GÖMZE

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Prof. Dr. László A. Gömze
chair of conference board

PREFACE

The competitiveness is one of the most important component of our life and it plays key role in efficiency both of organizations and societies. The more scientific supported and prepared organizations develop more competitive materials with better physical, mechanical, chemical and biological properties and the leading companies are applying more competitive equipment and technology processes.
The aims the 4th International Conference on Competitive Materials and Technology Processes (**ic-cmtp4**) and the Symposiums **is-ism1**, **is-icbm2** and **is-icm2** are the followings:

- Promote new methods and results of scientific research in the fields of material, biological, environmental and technology sciences;
- Change information between the theoretical and applied sciences as well as technical and technological implantations.
- Promote the communication between the scientist of different nations, countries and continents.

Among the major fields of interest are innovative materials with increased physical, chemical, biological, medical, thermal, mechanical properties and dynamic strength; including their crystalline and nano-structures, phase transformations as well as methods of their technological processes, tests and measurements. Multidisciplinary applications of material science and technological problems encountered in sectors like ceramics, glasses, thin films, aerospace, automotive and marine industry, electronics, energy, construction materials, medicine, biosciences and environmental sciences are of particular interest.

In accordance to the program of the conference **ic-cmtp4**, and its symposiums **is-ism1, is-icbm2** and **is-icm2** we have received more than **450** inquires and registrations frome **46** countries of **5** continents. Finally from them more than **240** abstracts were accepted for presentation, including the **10** PLENARY lectures. Scientists and researchers have arrived to Miskolc-Lillafüred (Hungary) from **41** countries of Asia, Europe, Africa, North and South America and Australia.

Together with co-authors in this book are presented abstracts from more than **700** scientists and researchers..

Prof. Dr. László A. Gömze
chair, ic-cmtp4

Content

Numerical Simulation of Mechanical Behaviour and Prediction of Effective Properties of Metal Matrix Composites with Consideration for Structural Evolution under Shock Wave Loading

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Mechanical behavior on mesoscopic scale level and effective mechanical properties of stochastic metal matrix composite materials under shock wave loading were investigated by means of computer simulation methods. Shock waves propagation in the mesoscopic volume of metal matrix composite (MMC), deformation processes, nucleation and growth of damages, and evolution of the structure of composite materials consisted of an aluminium matrix and randomly distributed ceramic (B_4C and SiC) inclusions were numerically simulated.

The results of the numerical simulation were used for numerical evaluation of effective elastic and strength properties (elastic moduli and elastic limits) of MMC with different values of volume concentration of ceramic inclusions. The numerical values of the effective mechanical characteristics of investigated materials were obtained, and the character of the dependence of the effective elastic and strength properties on the structure parameters of composites was determined. It was shown that the dependence of the numerical values of effective elastic moduli on the volume concentration of ceramic inclusions is nonlinear and monotonically increasing. The effective values of the elastic limits increase with increasing concentration of the inclusions, however, for the considered composites, this dependence is not monotonic.

Keywords: *composite materials, mechanical behavior, effective properties, structure, shock-wave loading, numerical simulation*