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Preface

Alan Prince

This issue of the *Journal of Alloys and Compounds* is dedicated to the memory of Alan Prince who devoted his professional life to the understanding of materials constitution, its application in industry and the transfer of skills and competence to young scientists. This issue can, at the same time, be seen as a snapshot of a discipline that published its first experimental results in around 1890, and today is more lively than ever before.

Since then, the question of how alloys may change their phase configuration when constituent elements are substituted, their concentration changes, temperature and pressure variations, has generated some hundred thousand publications on Zustandsdiagramme, Diagrammi Sostajanya or simply Phase Diagrams, in many world languages.

It was Alan Prince who, as an individual, started to list the world literature by element combination, and in 1956 issued his first bibliographic reference book on phase diagram related publications. Today, this work is continued in the electronic MSIT® Workplace, which monitors some 300 journals plus conference proceedings, and presents present, past and future information arranged by element combination. This work has revealed that one third of the total world literature in the field of phase constitution was published in the last 10 years, and increases every year. Therefore, it is clear that an electronic information system is required, if efficient, knowledge controlled progress in this field is to be achieved.

Research into the energetics which underpin the changes in phase configuration established another discipline, that of computational thermodynamics. This has become a very useful tool in research and application as more powerful simulation software has become available. Much effort in this field has been provided by the members of SGTE, the Scientific Group Thermodata Europe. However, the development of new user friendly calculation software is ongoing, as the first article of this issue demonstrates.

Experimental metallurgical research and thermodynamic calculation of phase equilibria have their specific strengths and shortcomings. They are both subjects in their own right, see for example the publication by Suzana G. Fries et al. [1] and E. Dichi and coauthors [2]. To combine both approaches in an intellectual evaluation of all available information is probably the most efficient way to gain an insight into the complexity of phase transformation and chemical reactions.

Such critical evaluation of often conflicting information requires interpretation skills in different subjects. Many distinctly different observations can reveal the nature of coexisting phases in an alloy; micrography, hardness and resistivity measurements, DTA, crystallographic analysis and a range of calorimetric techniques or mass spectrometry. Sample preparation has to be considered, as well as the validity of the different experimental techniques, when trying to resolve conflicting information. For example, in a ternary system, the phase diagram data have to be consistent with those of the edge binary systems. Over 14 years Alan Prince shared these skills with his colleagues in MSIT®, the Materials Science International Team. The ongoing cooperation of this team has so far created 18 volumes of the series *Ternary Alloys*, the leading compendium for critically evaluated ternary systems, published by MSI. This global program benefited greatly from the dedicated and critical contributions made by Alan Prince.

In spite of a hundred thousand publications and 100 years research the number of materials systems ever studied is negligible compared to the number of possible

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systems. Only 15% of the ternary systems which could be considered as candidate engineering materials have ever been touched experimentally. With this in mind APDIC, the Alloy Phase Diagram International Commission, coordinates the different national evaluation programs and has set the standards for binary and ternary evaluation work. As a founding member Alan Prince had taken an active role in APDIC. He served as editor in chief for the higher order systems and became the authority in consulting APDIC members. The APDIC members and their annual activity reports can be accessed in the MSIT® Workplace: http://www.msiwp.com.

Research funding is subject to trends but funding of basic research with roots reaching back 100 years is not very trendy. However materials scientists are known to be a clever breed and the inevitably needed basic data are increasingly hosted in application oriented works, subject to funding. That scatters data across many journals for different target groups. To assign the data to the materials system, ready for re-use in other applications is one target of the MSIT® Workplace which is a communication and research platform for workers in this field.

To know how a given material interacts with materials in service life or to know the alloying behavior of potential new high-tech materials, are leading questions in today's competitive markets. The application spectrum of materials constitution and thermodynamics has broadened accordingly and includes today all inorganic materials such as ceramics, reported by Hans J. Seifert et al. [3], or glass forming materials, studied by Nathalie Lebrun and H.J. van Miltenburg [4]. It extended into organic materials, as reported by Michael Hoch [5]. The applications cover a wide span, in this issue from new light metals in transportation business, Joachim Gröbner and Rainer Schmid-Fetzer [6], to tracing heavy metals in clinical waste incineration, studied by I. Delay et al. [7].

Even the name Materials Constitution does not reflect the field correctly anymore, instead coupled terms like phase diagrams and thermodynamics are frequently used. And if one includes liquid, gas and condensed phases in an iterative simulation of processing steps for complex materials systems, the subject becomes *Materials Chemistry*.

Consequently, the Phase Diagram Committee of the Institute of Materials, whose chairman Alan Prince had been for some years, recently changed its name to Materials Chemistry Committee.

Dear friends, this 'snap shot' is limited, both with respect to the subject and to Alan Prince. What remains is an attempt to express the high regard which we all have for Alan Prince.

With him we lost a competent scientist, an enjoyable man and to many of us a good friend, who has found his place in materials science and in our memories, forever.

Günter Effenberg
Stuttgart
March 2001

References

[1] S.G. Fries, I. Ansara, H.L. Lukas, Thermodynamic optimisation of the Pb–Tl binary system, J. Alloys Comp. 320 (2001) 228–233.
[2] E. Dichi, A. Wojakowska, B. Legendre, Study of the ternary system germanium–antimony–tin: experimental phase diagram, J. Alloys Comp. 320 (2001) 218–223.
[3] H.J. Seifert, J. Peng, H.L. Lukas, F. Aldinger, Phase equilibria and thermal analysis of Si–C–N ceramics, J. Alloys Comp. 320 (2001) 251–261.
[4] N. Lebrun, J.C. van Miltenburg, Calorimetric study of maltitol: correlation between fragility and thermodynamic properties, J. Alloys Comp. 320 (2001) 320–325.
[5] J. Hoch, Solubility of anthracene in the seven-component liquid system 1-propanol + 2-propanol + 1-butanol + 2-butanol + cyclohexane + heptane + 2,2,4-trimethylpentane at 298.15 K, J. Alloys Comp. 320 (2001) 276–281.
[6] J. Gröbner, R. Schmid-Fetzer, Selection of promising quaternary candidates from Mg–Mn–(Sc, Gd, Y, Zr) for development of creep-resistant magnesium alloys, J. Alloys Comp. 320 (2001) 296–301.
[7] I. Delay, J. Swithenbank, B.B. Argent, Prediction of the distribution of alkali and trace elements between the condensed and gaseous phases generated during clinical waste incineration, J. Alloys Comp. 320 (2001) 282–295.