Summary report for 2023 from Chinese Phase Diagram Committee

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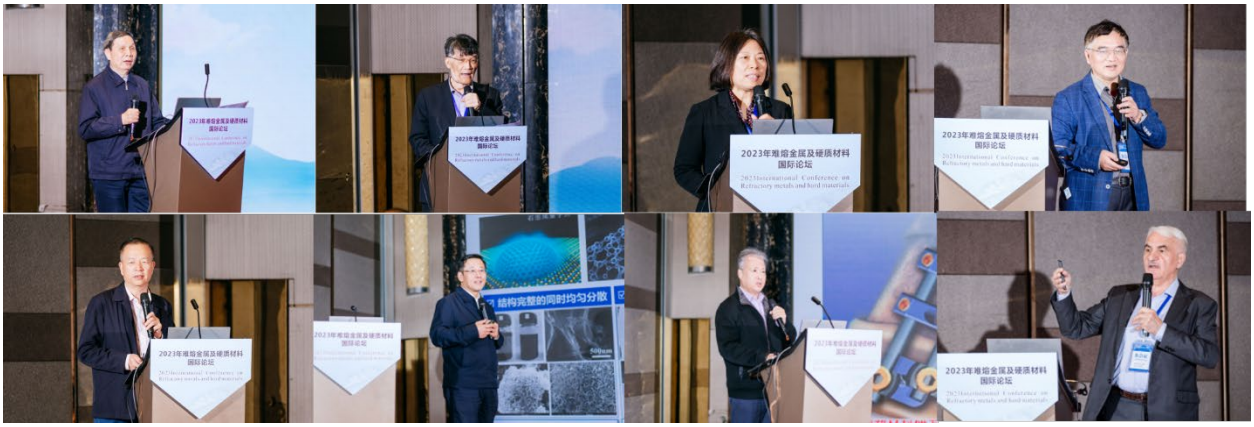
1. Activities with focus on phases diagrams, such as workshops, conference symposia or short courses: brief summary, weblink and/or program

Meeting: 2023 Annual Meeting of Chinese Phase Diagram Committee

From July 1st to 3rd, 2023 Annual Meeting of the Chinese Phase Diagram Committee was organized by the Chinese Phase Diagram Committee and Shihezi University in Urumqi, Xinjiang, and more than 40 representatives attended the meeting. At the meeting, researchers in the field of phase diagrams had in-depth academic exchanges and invited four outstanding experts, including Professor Huang Feng from Sun Yat sen University, Professor Lu Xiaogang from Shanghai University, Professor Yu Feng from Shihezi University, and Professor Sun Lixian from Guilin University of Electronic Science and Technology, to give brilliant academic presentations.

Meeting: 2023 International Conference on Refractory Alloys and Hard Materials

From March 31 to April 2, the 2023 International Conference on Refractory Alloys and Hard Materials (RAHM), co-sponsored by the School of Materials Science and Engineering of Shandong University, the State Key Laboratory of Powder Metallurgy of Central South University, the Key Laboratory of Non-ferrous Materials and Engineering of the Ministry of Education of Central South University, and Hunan Boyun Oriental Powder Metallurgy Co., Ltd., was successfully held in Changsha, Hunan. Huang Boyun, academician of the CAE Member, Shi Dongmei, chief technical engineer of the High tech Research and Development Center of the Ministry of Science and Technology, Zhang Zhongjian, executive chairman of the Zhuzhou Cemented Carbide Industry Association, Du Yong, professor of Central South University, Yi Jianhong, vice president of Kunming University of Technology, Qu Xuanhui, professor of Beijing University of Science and Technology, Dong Chuang, professor of Dalian University of Technology, Xu Dongsheng, researcher of the Institute of Metals of the Chinese Academy of Sciences, Professor Zhang Li from Central South University and Professor Liu Yi from Shanghai University attended this forum. 178 experts and postgraduates from domestic and foreign universities, research institutes, and related enterprises attended the meeting. There were 10 invited reports, 49 oral reports, and 28 posters, explaining the achievements and cutting-edge trends in the field of refractory metals and hard materials from different research fields, and exploring the role of integrated computing materials engineering in promoting the progress and development of China's refractory metals and hard materials industry. 8 oral reports and 7 posters are about phase diagrams and thermodynamics in cemented carbides.



China is a major country in the non-ferrous metal industry. As strategic metal elements and key industrial basic materials, refractory metals and hard materials have a wide and irreplaceable application demand. As the precursor and support for national economic construction and high-tech development, they are crucial for ensuring the healthy development of major national fields such as aerospace, energy transportation, equipment manufacturing, geological mining, and electronic information. In recent years, China has achieved leapfrog development and achievements in the fields of refractory metals and hard materials. As an important engine for high-quality development and progress in important fields, technological innovation will greatly enhance China's political and economic status and pattern in the world. The significance of this international Conference is to establish an international exchange platform for refractory metals and hard materials, and further promote the international influence of China's refractory metals and hard materials industry.

Meeting: 2023 National Conference for Young Scholars in Phase Diagram

From December 8th to 11th, 2023 National Conference for Young Scholars in Phase Diagram was hosted by Chinese Phase Diagram Committee and Kunming University of Technology. 177 scholars attended the conference. The conference invited 14 renowned scholars, such as Professor Liu Xingjun from the Shenzhen Campus of Harbin Institute of Technology, Researcher Song Haifeng from the Beijing Institute of Applied Physics and Computational Mathematics, and Professor Liu Libin from Central South University etc, to give the presentations. A total of 61 participants were invited to give oral presentations and 50 posters were presented. A total of 125 papers were exchanged during the conference.

Meeting: 2023 International Workshop on Materials and AI-based Design

The 2023 International Workshop on Materials and AI-based Design was hosted by Chinese Phase Diagram Committee and Ili Normal University from July 4th to 6th, 2023. The renowned experts, such as Manuel Doblare, Academician of the Royal Spanish Academy of Engineering, Changjiang Scholar, recipient of the National Outstanding Youth Science Fund, and Chief Scientist of the National Key Research and Development Program were invited to give an invitation speech. The conference focused on the international forefront of materials and intelligent design, implementation plans for major national scientific and technological innovation

projects, as well as topics such as material physics research, biomaterial research and development, and intelligent development strategies for biochip design.

2. Representative publications in 2023 selected by Chinese Phase Diagram Committee

(1) Yinping Zeng, Yong Du, and Rainer Schmid-Fetzer, “A novel computational framework to calculate Gibbs energy and phase transitions under external magnetic fields applied to the Bi–Mn system”, ***Acta Mater.,*** 243, 118496-11 (2023).

(2) Qiang Lu, Jianchuan Wang, Hongcheng Li, Shenbao Jin, Gang Sha, Jiangbo Lu, Li Wang, Bo Jin, Xinyue Lan, Liya Li, Kai Li, and Yong Du, “Synergy of multiple precipitate/matrix interface structures for a heat resistant high-strength Al alloy”, ***Nature Communications,*** 14, 2925-12(2023).

(3) Yong Du, Rainer Schmid-Fetzer, Jincheng Wang, Shuhong Liu, Jianchuan Wang, and Zhanpeng Jin, “Computational Design of Engineering Materials: Fundamentals and Case Studies”, 498 pages, ***Cambridge University Press***, United Kingdom, 2023.

(4) Zhao, Z, Li, Y. R., Wang, H. B., Shan, Y. P., Liu, X. M., Wu, M. F., Zhang, X. P., Song, X. Y, “Ultra-tough self-healing hydrogel via hierarchical energy associative dissipation”, ***Adv. Sci***., 2023, 10(27), 2303315.

(5) Hou, C, Lu, H., Zhao, Z., Huang, X. T., Han, T. L., Luan, J. H., Jiao, Z. B., Song, X. Y, Nie Z. R, “Mechanical performance of hierarchically nanostructured W-Cu composite produced via mediating phase separation”, ***Engineering***, 2023, 26, 173-184.

(6) Jiang, W. T., Lu, H, Chen, J. H., Luo, L., Liu, X. M., Wang, H. B., Song, X. Y, “Toughening Ceramic-based Composites by Homogenizing Lattice Strain at Phase Boundaries”, ***ACS Appl. Mater. Interface***, 2023, 15, 19604-19615.

(7) Yushui Tian, Yulu Zhou, Miao Zhao, Yifang Ouyang, and Xiaoma Tao, Effective control of oxygen defects by co-doping of ferroelectric HfO_2, ***Applied Physics Letter***, 123, 132901-5 (2023).

(8) Meng Zeng, Kuixin Lin, Zhukun Zhou, Hongmei Chen, Xiaoma Tao, Yifang Ouyang, Yong Du, Effects of 3D graphene networks on the microstructure and physical properties of SiC/Al composites, ***Ceramics International,*** 49, 8140-8147(2023).

(9) Kuixin Lin, Yongkang Tan, Hongmei Chen, Xiaoma Tao, Yifang Ouyang, Yong Du, Phononic characteristics to determine absorbing shock-wave energy for low-dimensional materials, ***Carbon***, 203, 410-415 (2023).

(10) Yang, P. J., Li, S. S., Xie, H. B., Jin, J. F., Liu, C. W., Pan, H. C., Ren. Y. P., Jia, W. T., Zong, Y. P., Qin, G. W, “Two-dimensional interface superstructures assembled by well-ordered solute atoms”, ***J Mater Sci Technol***, 2023, 142, 253-259.

(11) Lou, W. X., Xie, H. B, Zhao, X. B., Bai, J. Y., Zhang, H. H., Wang, Y., Li, X. Z., Pan, H. C., Ren. Y. P., Qin, G. W, “Variable precipitation behaviors of laves phases in an ultralight Mg-Li-Zn alloy”, ***J. Magnes. Alloys***, 2023, 11(6), 2018-2026.

(12) Ren, Y. P, Lou, D. F., Zhang, M. D., Lv, M. Y., Li, H. X., Qin, G. W, “Fabrication, Microstructures, and Mechanical Properties of Zn-0.1Mg-1Mn (wt.%) Alloy Tube”, ***Journal of Materials Engineering and Performance***, 2023, 32(2), 793-802.

(13) Jiaxing Sun, Cuiping Guo, Changrong Li, and Zhenmin Du, “Experimental investigation and thermodynamic description of the Co–Nb–Zr system”, ***Metall. Mater. Trans. A***, 54, 3021-3044 (2023).

(14) Jiaxing Sun, Cuiping Guo, Changrong Li, Zhenmin Du, “Experimental investigation and thermodynamic optimization of the Co–Ta–Zr system”, ***J. Alloy. Compd.,*** 953, 170013 (2023).

(15) Jiaxing Sun, Chunyu Ming, Bo Yang, Cuiping Guo, Changrong Li, Zhenmin Du, “Experimental investigation and thermodynamic description of the Fe–Hf–Nb system”, ***J. Alloy. Compd.,*** 939 168696 (2023).

(16) Junlin Yang, Qianyi Li, Minghan Jing, Donglai Li, Haibo Jin, Jingbo Li, “Lattice stress engineering induced by rare-earth ion in regulating phase transition and thermochromic properties of VO_2 films”, ***Ceram. Int.***, 493, 4309–34315 (2023).

(17) Zhengjing Zhao, Donglai Li, Junlin Yang, Jingbo Li, Haibo Jin, “Metal-insulator transition tuned by valence variation of Nb dopants in Nb-doped VO_2 films”, ***Appl. Surf. Sci.***, 635, 157705-7 (2023).

(18) Mian Azmat, Haibo Jin, Kashif Naseem, Chen Ling, Jingbo Li, “A comparative study uncovering the different effect of Nb, Mo and W dopants on phase transition of vanadium dioxide”, ***J. Phys. Chem. Solids***, 180, 111439 (2023).

(19) Zixuan Deng, Qi Hu, Yueyan Tian, Renhao Xue, Ligang Zhang, Libin Liu, “Experimental investigation and thermodynamic assessment of the Al–Ag–Sc system”, ***Journal of Alloys and Compounds*** 934 (2023) 167980.

(20) Zixuan Deng, Yanjun Ding, Patrick J. Masset, Kaige Wang, Ligang Zhang, Libin Liu, “Thermodynamic description of the Al–Ag–Zr system and discovery of the high-strength ternary phase Al1.84Ag0.16Zr”, ***J Mater Sci*** (2023) 58:10516–10538.

(21) Liang Lv, Zixuan Deng, Hongyu Zhang, Libin Liu, Ligang Zhang, “Thermodynamic assessment of the ternary Ni–Ti-Hf system”, ***CALPHAD***, 81 (2023) 102546.

(22) Rong Ou, Ruyi Jiang, Yukun Huang, Wei He, and Cuiyun He, “Phase equilibria of the Mg-Sn-Nd ternary system at 400 °C,” ***Calphad,*** 82, 102564 (2023).

(23) Peisheng Wang, Wei He, and Honghui Xu, “Phase equilibria at 500 °C of the Mg-Nd-Zn system in the region of 0–50 at%Nd,” ***Calphad,*** 83, 102614 (2023).

(24) Cuiyun He, Ximin Chen, Ping Wang, and Jingxian Wen, “Experimental phase equilibria of the Mg–Sn–Ce ternary system at 800 K,” ***Calphad,*** 83, 102620 (2023).

(25) Y.H. Pang, C.Y. He, N.L. Qin, and J.L. Yan, “Structural, magnetic and thermoelectric properties of double perovskite $Nd_2Co_{1-x}Cr_xMnO_6$,” ***Mater. Today Commun.,*** 35, 105530 (2023).

(26) Xiangbiao Shi, Liping Xu, Fangqi Xiao, Guangcan Ma, Kai Xu, Hongqun Tang, and Dandan Huang, “Phase relationships investigation of the Al-Ti-La ternary system,” ***J. Alloy. Compd.,*** 948, 169800 (2023).

(27) Xuezhen Che, Shengyang Qin, Junkun Huang, Xiangbiao Shi, and Dandan Huang, “A study on the phase diagram of Re-Zr refractory system,” ***International Journal of Refractory Metals and Hard Materials,*** 114, 106259 (2023).

(28) Tianfan Ye, Gang Qu, Yurong Song, and Dandan Huang, “Experimental study of the phase relationships in the CeO_2–Gd_2O_3 system at 1200°C to 1600°C in air,” ***Materials Chemistry and Physics*****,** 295, 127126 (2023).

3. Member roster

List of members of Chinese Phase Diagram Committee are as follows:

- Chu Maoyou, *General Research Inst. for Nonferrous Metals, Beijing*
- Cui Yuwen, *Nanjing Univ, of Tech., Nanjing*
- Dong Chuang, *Dalian Univ. of Tech., Dalian*
- Du Yong, *Central South Univ., Changsha*
- Du Zhenmin, *Univ. of Sci. & Tech. Beijing, Beijing*
- Guo Cuiping, *Univ. of Sci. & Tech. Beijing, Beijing*
- Huang Feng, *Ganjiang Innovation Academy, Chinese Academy of Science, Ganzhou*
- Jiang Min, *Northeastern Univ., Shenyang*
- Li Guobao, *Peking Univ., Beijing*
- Li Jingbo, *Beijing Univ. of Tech., Beijing*
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