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- (9) Huang Y, Kin W K, **Lan S**, et al. Observation of distinct atomic relaxation process in a phase-separated metallic glass-forming melt[J]. EPL (Europhysics Letters), 2014, 108(4): 46001.
- (10) Wu Z D, Zhou W Z, Lo Y F, et al. On the short-range orders in spinodal Pd Ni P bulk metallic glasses[J]. Journal of Non-Crystalline Solids, 2015, 410: 51-57.
- (11) Wu Z D, **Lan S**, Kui H W. Crystallization of Phase-Separated Pd₄₁. 25Ni₄₁. 25P_{17.5} BMGs[J]. Metallurgical and Materials Transactions A, 2014, 45(5): 2399-2404.
- (12) Pramanick A, Jørgensen M R V, Diallo S O, Christianson A D, Fernandez Baca J A, Hoffmann C, Wang X, **Lan S**, Wang X-L. Ferroelectric Materials: Nanoscale Atomic Displacements Ordering for Enhanced Piezoelectric Properties in Lead Free ABO₃ Ferroelectrics (Adv. Mater. 29/2015)[J]. Advanced Materials, 2015, 27(29): 4329-4329.
- (13) Wu Z D, **Si Lan**, Hin Wing Kui, Crystallization of phase separated BMGs, **TMS2013 Supplemental Proceedings**, Part III: Bulk Metallic Glasses X, 2013, 266: 259-266.
- (14) Xiao W K, Han C C, **Lan S**, Ruan X F. Effect of electrical pulse on dynamic crystallization of ferrite and properties High-Carbon Chromium steel, The 2nd International Conference on Mechanic Automation and Control Engineering (**MACE 2011**) **Proceeding**, July, 2011.
- (15) Fan T T, Xiao W K, Li L, **Lan S**, Li X T, "Research of Cr_{1-x}M_xN's (M=Al,V,Ti,etc.,x=0.5) Coating Valence Electron Structure Calculation and Wear-Resisting Performance", Advanced Materials Research, 2013, 706-708: 238-243.
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- (1) **Si Lan**, Xun-li Wang, et al., liquid-to-liquid phase transition in a supercooled glass-forming metallic liquid, Nature Communications, Under review, 2016.
- (2) **Si Lan**, Xun-Li Wang, et al., In-situ studies of transition of classic to avalanche nucleation in Zr-Cu-Al bulk metallic glasses and the correlation with glass-forming ability, Submitted to Acta Materialia, 2016.
- (3) Xuelian Wu, **Si Lan**, et al., Probing atomic-to-nanoscale structures of Zr-based binary metallic glasses and the correlation with glass-forming ability, Journal of Alloys and Compounds, Under review, 2016.

(4) M Naeem, **Si Lan** et al., Suppression of crystallization in Ca-based bulk metallic glass under compression, Submitted to Scripta Materialia, 2016.

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(1) **Si Lan, Xiaoya Wei**, Jie Zhou, Zhaoping Lu, Jörg Neuefeind, Tao Feng, Xun-Li Wang, In-situ neutron scattering study of phase stability in BMGs and nanoglasses, Oral presentation, BMG XI, St. Louis, USA, 2016.

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(3) **Si Lan, Xiaoya Wei**, Jie Zhou, Zhaoping Lu, Jörg Neuefeind, Xun-Li Wang, In-situ neutron scattering and TEM study of transition of crystallization pathways in ternary bulk metallic glasses, Oral presentation, America Materials Research Society (MRS) 2015 fall meeting, Boston, MA, USA, 2015.

(4) **Si Lan**, et al. Liquid-to-liquid phase transition underlying the structural crossover in a supercooled metallic liquid, Gordon Research Conference on Neutron Scattering, Presentation, Hong Kong, 2015.

(5) Si Lan, Xiaoya Wei, Jie Zhou, Zhaoping Lu, Jörg Neuefeind, Xun-Li Wang, In-situ neutron scattering and TEM study of transition of crystallization pathways in ternary bulk metallic glasses, Oral presentation, **Asia-Oceania Neutron Scattering Association** 2015 annual meeting, Sydney, Australia, 2015 July.

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(8) **Si Lan**, Jie Zhou, Zhaoping Lu, Mikhail Feygenson, Jörg Neuefeind, Xun-Li Wang, In-situ neutron scattering study of crystallization kinetics in ternary bulk metallic glasses, Invited oral presentation, TMS 2014 annual meeting & exhibition, San Diego, USA, 2014.

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(10) **Si Lan**, Yeuk Lan Yip, Man Tat Lau, Hin Wing Kui, Amorphous phase separation in a bulk metallic glass with negative heating of mixing, Oral presentation, TMS 2012 Annual meeting & exhibition, Orlando, FL, USA.

(11) **Si Lan**, Amorphous phase separation in a bulk metallic glass of negative heat of mixing, invited oral presentation, City University of Hong Kong, Hong Kong, 2013.

(12) **Si Lan**, Jie Zhou, Zhaoping Lu, Xun-Li Wang, In-situ neutron scattering study of crystallization kinetics in ternary bulk metallic glasses, Oral presentation, Hong Kong Physics Society 2013 annual meeting, Chinese University of Hong Kong, Hong Kong, 2013.

(13) **Si Lan**, Jie Zhou, Zhaoping Lu, Mikhail Feygenson, Jörg Neufeind, Xun-Li Wang, In-situ neutron scattering and TEM study of crystallization kinetics in ternary bulk metallic glasses, Oral presentation, America Materials Research Society (MRS) 2013 fall meeting, Boston, MA, USA, 2013.

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(15) Man Tat Lau, **Si Lan**, Yeuk Lan Yip, Hin Wing Kui, Determination of Phase Separation in Amorphous $Pd_{(40+0.5x)}Ni_{(40+0.5x)}P_{(20-x)}$ BMG for $x = 0$ to 4, Co-author, TMS 2012 Annual meeting & exhibition, Orlando, FL, USA.

(16) Zhen Duo Wu, **Si Lan**, Hin Wing Kui, Crystallization of phase separated $Pd_{41.25}Ni_{41.25}P_{17.5}$ BMGs, Co-author, TMS 2013 Annual meeting & exhibition, San Antonio, TX, USA.

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silan3@cityu.edu.hk

Research Interests: BMGs; Nanoglasses; Energy Materials; Neutron and Synchrotron Scattering; In-situ TEM.



1. Present Academic Position

Assistant Professor (Oct 2014-now) Herbert Gleiter Institute, Nanjing University of Science and Technology

2. Working Experience

Associate Professor, Deputy Director of Center of Neutron Science and Technology (Part-time), (Mar 2014-Now) City University of Hong Kong Shenzhen Research Institute

Postdoctoral Research Fellow (Nov 2012-Oct 2014), Department of Physics and Materials Science, City University of Hong Kong, Supervisor: Prof. WANG Xun-Li, The Best Proposal Award, 2013 International School on Neutron Scattering, Oxford University and ISIS.

3. Academic Experience

Period	Academic Experience
Aug 2009 - Oct 2012	PhD in Materials Science and Engineering, Department of Physics, The Chinese University of Hong Kong. Cumulative GPA: 3.955/ 4.0 C N Yang Scholarship (3 out of 112 research students in CUHK received this scholarship in 2012.)
Sep 2007 - Jun 2009	MS in Materials Processing Engineering, Department of Materials Engineering, Wuhan University. GPA: 3.90/ 4.00 Excellent communist party member award in Wuhan University
Sep 2003 - Jun 2007	BS in Materials Science and Engineering, Chengdu University of Technology. Chair of Student Committee. Major GPA: 3.94/ 4.0 Rank 1 st out of 160 Students Excellent undergraduate student in Sichuan province Excellent student leader in Sichuan province, Third medal Whole-person developed undergraduate student in Sichuan Third place of China Challenge Cup Entrepreneurship.

4. Funds

National Science Foundation of China for Young Scientist (25 W, hold);
Foundation for Central Universities, International Cooperation with Hong Kong (20 W, hold);
National Science Foundation of China (two different funding, ~350 W total, key member)
National Key Foundation, Ministry of Science and Technology of China (Neutron Scattering Extreme Environments, ~3300 W total, key member)

5. Service for community and honors

Jiangsu Province Double-Creative Scheme;
Co-chair, Gordon Research Seminars on Neutron Scattering, 2016-2017;
MRS, TMS, HKPS members; Intermetallic, Journal of Materials Science Reviewer;

6. Publications

Published

- (1) **Lan S**, Blodgett M, Kelton K F, et al. Structural crossover in a supercooled metallic liquid and the link to a liquid-to-liquid phase transition[J]. Applied Physics Letters, 2016, 108(21): 211907.
- (2) **Lan S**, Wei X, Zhou J, et al. In-situ study of crystallization kinetics in ternary bulk metallic glass alloys with different glass forming abilities[J]. Applied Physics Letters, 2014, 105(20): 201906.
- (3) **Lan S**, Yip Y L, Lau M T, et al. Direct imaging of phase separation in Pd 41.25 Ni 41.25 P 17.5 bulk metallic glasses[J]. Journal of Non-Crystalline Solids, 2012, 358(10): 1298-1302.
- (4) **Lan S**, Lau M T, Kui H W. The time constant of the spinodal decomposition in Pd 41.25 Ni 41.25 P 17.5 bulk metallic glasses[J]. Journal of Non-Crystalline Solids, 2013, 361: 1-8.
- (5) **Lan S**, Wu Z D, Lau M T, et al. Crystallization in homogeneous and phase-separated Pd 41.25 Ni 41.25 P 17.5 bulk metallic glasses[J]. Journal of Non-Crystalline Solids, 2013, 373: 5-12.
- (6) **Lan S**, Blodgett M, Kelton K F, et al. Liquid-to-liquid phase transition underlying the structural crossover in a supercooled metallic liquid[J]. arXiv preprint arXiv:1509.03394, 2015.
- (7) Jiao W, Wang X L, **Lan S**, et al. Propensity of bond exchange as a window into the mechanical properties of metallic glasses[J]. Applied Physics Letters, 2015, 106(6): 061910.
- (8) Lau M T, **Lan S**, Yip Y L, et al. A metastable liquid state miscibility gap in undercooled Pd Ni P melts[J]. Journal of Non-Crystalline Solids, 2012, 358(18): 2667-2673.

- (9) Huang Y, Kin W K, **Lan S**, et al. Observation of distinct atomic relaxation process in a phase-separated metallic glass-forming melt[J]. EPL (Europhysics Letters), 2014, 108(4): 46001.
- (10) Wu Z D, Zhou W Z, Lo Y F, et al. On the short-range orders in spinodal Pd Ni P bulk metallic glasses[J]. Journal of Non-Crystalline Solids, 2015, 410: 51-57.
- (11) Wu Z D, **Lan S**, Kui H W. Crystallization of Phase-Separated Pd₄₁. 25Ni₄₁. 25P_{17.5} BMGs[J]. Metallurgical and Materials Transactions A, 2014, 45(5): 2399-2404.
- (12) Pramanick A, Jørgensen M R V, Diallo S O, Christianson A D, Fernandez Baca J A, Hoffmann C, Wang X, **Lan S**, Wang X-L. Ferroelectric Materials: Nanoscale Atomic Displacements Ordering for Enhanced Piezoelectric Properties in Lead Free ABO₃ Ferroelectrics (Adv. Mater. 29/2015)[J]. Advanced Materials, 2015, 27(29): 4329-4329.
- (13) Wu Z D, **Si Lan**, Hin Wing Kui, Crystallization of phase separated BMGs, **TMS2013 Supplemental Proceedings**, Part III: Bulk Metallic Glasses X, 2013, 266: 259-266.
- (14) Xiao W K, Han C C, **Lan S**, Ruan X F. Effect of electrical pulse on dynamic crystallization of ferrite and properties High-Carbon Chromium steel, The 2nd International Conference on Mechanic Automation and Control Engineering (**MACE 2011**) **Proceeding**, July, 2011.
- (15) Fan T T, Xiao W K, Li L, **Lan S**, Li X T, "Research of Cr_{1-x}M_xN's (M=Al,V,Ti,etc.,x=0.5) Coating Valence Electron Structure Calculation and Wear-Resisting Performance", Advanced Materials Research, 2013, 706-708: 238-243.
- (16) JIA Xi-guang, CHEN Shan-hua, TAO Qiao, **LAN Si**, YANG Xi. Preparation and Corrosion Resistance of CeO₂ Film on Magnesium Alloy, Materials protection, China, 4, 2009. Chinese database
- (17) **Lan Si**, Zhang Zhouquan, Guan Denggao. Model Building and Property Investigation of Single Layer Nickel Based Electromagnetic Shielding Composite Materials in Wide Frequency., China Sci. and Tech. Rev., 24, 2008. Chinese database

In submission and under review

- (1) **Si Lan**, Xun-li Wang, et al., liquid-to-liquid phase transition in a supercooled glass-forming metallic liquid, Nature Communications, Under review, 2016.
- (2) **Si Lan**, Xun-Li Wang, et al., In-situ studies of transition of classic to avalanche nucleation in Zr-Cu-Al bulk metallic glasses and the correlation with glass-forming ability, Submitted to Acta Materialia, 2016.
- (3) Xuelian Wu, **Si Lan**, et al., Probing atomic-to-nanoscale structures of Zr-based binary

metallic glasses and the correlation with glass-forming ability, *Journal of Alloys and Compounds*, Under review, 2016.

(4) M Naeem, **Si Lan** et al., Suppression of crystallization in Ca-based bulk metallic glass under compression, Submitted to *Scripta Materialia*, 2016.

7. Conference and invited talks

(1) **Si Lan, Xiaoya Wei**, Jie Zhou, Zhaoping Lu, Jörg Neuefeind, Tao Feng, Xun-Li Wang, In-situ neutron scattering study of phase stability in BMGs and nanoglasses, Oral presentation, BMG XI, St. Louis, USA, 2016. Oral

(2) M Naeem, **Si Lan** et al., Suppression of crystallization in Ca-based bulk metallic glass under compression. Hong Kong Physics Society annual meeting, Hong Kong, 2016 July. (Oral)

(3) **Si Lan, Xiaoya Wei**, Jie Zhou, Zhaoping Lu, Jörg Neuefeind, Xun-Li Wang, In-situ neutron scattering and TEM study of transition of crystallization pathways in ternary bulk metallic glasses, Oral presentation, America Materials Research Society (MRS) 2015 fall meeting, Boston, MA, USA, 2015. Oral

(4) **Si Lan**, et al. Liquid-to-liquid phase transition underlying the structural crossover in a supercooled metallic liquid, Gordon Research Conference on Neutron Scattering, Presentation, Hong Kong, 2015. (Poster)

(5) Si Lan, Xiaoya Wei, Jie Zhou, Zhaoping Lu, Jörg Neuefeind, Xun-Li Wang, In-situ neutron scattering and TEM study of transition of crystallization pathways in ternary bulk metallic glasses, Oral presentation, **Asia-Oceania Neutron Scattering Association** 2015 annual meeting, Sydney, Australia, 2015 July. Oral

(6) Si Lan Xunli Wang et al. In-situ structure studies of liquids and soft-magnetic amorphous alloys, NSFC committee and Amorphous Alloys Alliance Liquid Structure Seminars Hefei Industrial University Hefei 2015. Oral

(7) Si Lan Xunli Wang et al. The Applications of In-situ SANS in BMGs CSNS SANS Instrument Senior User Meeting CSNS Guangdong Dongguan 2015. (oral)

(8) **Si Lan**, Jie Zhou, Zhaoping Lu, Mikhail Feygenson, Jörg Neuefeind, Xun-Li Wang, In-situ neutron scattering study of crystallization kinetics in ternary bulk metallic glasses, Invited oral presentation, TMS 2014 annual meeting & exhibition, San Diego, USA, 2014. Oral

(9) **Si Lan**, Jie Zhou, Zhaoping Lu, Mikhail Feygenson, Jörg Neuefeind, Xun-Li Wang, In-situ study of crystallization kinetics and its correlation to glass-forming ability for ternary bulk metallic glasses, Oral presentation, BMG X, Shang Hai, China, 2014. Oral

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(11) **Si Lan**, Amorphous phase separation in a bulk metallic glass of negative heat of mixing, invited oral presentation, City University of Hong Kong, Hong Kong, 2013. Oral

(12) **Si Lan**, Jie Zhou, Zhaoping Lu, Xun-Li Wang, In-situ neutron scattering study of crystallization kinetics in ternary bulk metallic glasses, Oral presentation, Hong Kong Physics Society 2013 annual meeting, Chinese University of Hong Kong, Hong Kong, 2013. Oral

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(14) **Si Lan**, Jie Zhou, Zhaoping Lu, Mikhail Feygenson, Jörg Neufeind, Xun-Li Wang, In-situ neutron scattering and TEM study of crystallization kinetics in ternary bulk metallic glasse, The 1st CSNS Annual User Meeing Guangdong Dongguan Dec 2013 Oral

(15) Man Tat Lau, **Si Lan**, Yeuk Lan Yip, Hin Wing Kui, Determination of Phase Separation in Amorphous $\text{Pd}_{(40+0.5x)}\text{Ni}_{(40+0.5x)}\text{P}_{(20-x)}$ BMG for $x = 0$ to 4, Co-author, TMS 2012 Annual meeting & exhibition, Orlando, FL, USA. Oral

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8. Research visiting and oversea study experience

- 2016 July, Research visited Sector 1-ID-E at **Advanced Photon Source (APS)**, Argonne National Laboratory (ANL), USA, for high temperature deformation study using in-situ WAXS/SAXS;
- 2015 November, Research visited Sector 1-ID-E at **Advanced Photon Source (APS)**, Argonne National Laboratory (ANL), USA, for liquid structure study with synchrotron x-ray Beamline using in-situ WAXS/SAXS;
- 2015 September, Visited Hokkaido University Microscopy Centers for in-situ study of liquid structure using high tension TEM and Cs corrected HRTEM;
- 2015 August, Visited 11-ID-C at **Advanced Photon Source (APS)**, Argonne National Laboratory (ANL), USA, for high temperature deformation study in Ca-based BMGs using in-situ PDF;
- 2015 July, Visited ANSTO Quokka beamline for simultaneous DSC-SANS study of crystallization and liquid transition in BMGs;
- 2014 November, Visited J-PARC NOVA beamline for study of dynamics of BMGs

- (Phonons) using in-elastic neutron scattering;
- 2014 May, Research visited NOMAD diffractometer at **Spallation Neutron Source (SNS)**, Oak Ridge National Laboratory (ORNL), USA, for in-situ neutron scattering study of crystallization kinetics
 - 2014 March, Research visited Sector 11-ID-C at **Advanced Photon Source (APS)**, Argonne National Laboratory (ANL), USA, for liquid structure study with synchrotron x-ray Beamline using in-situ PDF;
 - 2013 November, Research visited **Washington University in St. Louis**, USA, for data collection and analysis of collaborated Beamline Electrostatic Levitation experiments.
 - 2013 September, Studied in 13th **Oxford School on Neutron Scattering**, held by ISIS Spallation Neutron Source and Oxford University, and won **Best Proposal Award**.
 - 2013 July, Research visited Sector 11-ID-C at **Advanced Photon Source**, Argonne National Laboratory, USA, for in-situ synchrotron scattering study of crystallization kinetics
 - 2013 June, Research visited Sector 6-ID-D at **Advanced Photon Source (APS)**, Argonne National Laboratory (ANL), USA, for liquid structure study with synchrotron x-ray Beamline Electrostatic Levitation
 - 2013 May, Research visited NOMAD diffractometer at **Spallation Neutron Source (SNS)**, Oak Ridge National Laboratory (ORNL), USA, for in-situ neutron scattering study of crystallization kinetics
 - 2013 April, Research visited State Key Laboratory for Advanced Metals and Materials, University of Science and Technology Beijing, for preparing ternary Zr-based bulk metallic glasses
 - Beam time proposals have been awarded frequently in SNS, ANSTO, J-PARC, APS etc..

9. Main Research and Professional Experience

9.1 Neutron and synchrotron scattering study of structural evolution in complex materials (Nov 2012-now, Form postdoc research until now)

We deployed in-situ neutron/synchrotron scattering and in-situ transmission electron microscopy (TEM) to study the structure evolution in BMGs while phase transitions take place. Structure evidence for phase transitions in selected BMG systems has been obtained by using excellent neutron and synchrotron sources in the world (SNS, ISIS, J-PARC, APS, Spring8, KENS etc.).

- **In-situ neutron and synchrotron scattering study of crystallization kinetics in ternary bulk metallic glasses**

To determine the nature of glass-forming ability (GFA), it is desirable to investigate the crystallization kinetics. However, complex chemistry in multicomponent alloys hinders the process to study the physics of crystallization, so it is necessary to simplify the chemistry. In this project, crystallization kinetics in two ternary BMGs, $Zr_{56}Cu_{36}Al_8$ and $Zr_{46}Cu_{46}Al_8$ with different GFAs, was studied using time-resolved neutron and synchrotron diffraction and in-situ TEM. The results revealed two different crystallization pathways and suggest that the development of medium and long-range ordering for $Zr_{46}Cu_{46}Al_8$ with better GFA may be more difficult than that for $Zr_{56}Cu_{36}Al_8$ with poorer GFA. Research papers are published in international journals (Appl. Phys. Lett., Acta Mater. etc.).

- **Probing structural evolution for liquid phase transitions in glass-forming metallic liquids: a Beamline Electrostatic Levitation study**

Physics in metallic liquids has attracted increasing attention because of its connection with the structure stability and glass-forming ability of bulk metallic glasses (BMGs). However, the occurrence of intervening crystallization limits the physics studies in the important temperature regime of undercooled metastable glass-forming metallic liquids. This results in a fact that important physics for metastable supercooled liquids are missing. To probe the structural evolution for metallic liquids during heating and cooling, easy glass-forming metallic liquids were chosen for study and Electrostatic Levitation equipped at sector 6-ID-D in APS, USA is employed. Structure evidence of a liquid phase transition has been identified for a liquid VIT106 alloy. Related papers have been preparing for submission to Physical review letters etc.. Another experimental proposal was also approved at sector 11-ID-C in APS, USA for 2014 A operation cycle. Several high-profile papers has be published in international journals.

9.3 Neutron and synchrotron scattering study for phase stability and plasticity interfaces in nanoglasses (Nov 2014-now, NJUST research)

- **Synchrotron scattering study of Ni-P nanoglasses with ultra-thermal-stability**
- **Simultaneous WAXS/SAXS and in-situ TEM studies of plasticity of Ni-P nanoglasses**

9.3 Amorphous phase separation in a bulk metallic glass of negative heat of mixing (Aug 2009-Oct 2012, PHD research)

- **Direct imaging of phase separation in Pd_{41.25}Ni_{41.25}P_{17.5} bulk metallic glasses**
The alloy system, Pd_{41.25}Ni_{41.25}P_{17.5}, has a negative heat of mixing among its constituent elements. By using high resolution transmission electron microscopy, high angle annular dark field in scanning transmission mode, and energy dispersive x-ray spectroscopy, it was found that phase separation occurs in Pd_{41.25}Ni_{41.25}P_{17.5} glassy alloys. For a clear exhibition of the amorphous phase separation reaction, it is desirable to introduce intermediate thermal annealing before an undercooled Pd_{41.25}Ni_{41.25}P_{17.5} melt is cooled down to become a solid amorphous specimen. The results suggest that there may be unique short range orders in amorphous/liquid Pd_{41.25}Ni_{41.25}P_{17.5}, which are responsible for the phase separation. The research work has been published in Journal of Non-Crystalline solids.
- **A metastable liquid state miscibility gap in undercooled Pd-Ni-P melts**
In this work, BMG of compositions, Pd_{40+0.5x}Ni_{40+0.5x}P_{20-x} with x = 0 to 3.5, were studied for amorphous phase separation. It occurs for x < 1, but absent for x > 1. In addition, in phase-separated specimens, the characteristic size or wavelength of the decomposed phases was measured. It was found that they obey the lever rule. The experimental results suggest the existence of a metastable liquid/amorphous miscibility gap. Its origin is attributed to unique short range orders in the undercooled Pd-Ni-P melts. This work has been published in Journal of Non-Crystalline solids.

- **The time constant of the spinodal decomposition in Pd_{41.25}Ni_{41.25}P_{17.5} bulk metallic glasses**

Experimental arrangements were made to study the spinodal reaction occurring in undercooled molten Pd_{41.75}Ni_{41.75}P_{17.5} alloys as a function of time. The lower bound of the time constant τ of the spinodal decomposition at a temperature of 625 K is 0.002 s⁻¹. This paper has been published in Journal of Non-Crystalline solids.

- **Crystallization of amorphous Pd_{41.25}Ni_{41.25}P_{17.5}: Homogeneous and phase-separated bulk metallic glasses**

Pd_{41.25}Ni_{41.25}P_{17.5} BMG can be prepared in three different microstructures: a homogeneous glass (A-type), a homogeneous glass with crystalline precipitates (B-type), and a phase-separated glass (C-type). They were thermally annealed at different temperatures for partial crystallization. The crystallization behaviors of these different types of specimens has been characterized by TEM and DSC etc.. A paper has been published in Journal of Non-Crystalline solids.

- **Synthesis of Zr-based Ti-based and Fe-based BMGs and nanostructured alloys by arc-melting or fluxing**

9.4 Plastic deformation mechanism of high-carbon chromium steels with electrical pulse heat treatment (Sep 2007-Jun 2009, MS research)

- In this project, a novel method of plastic deformation of hard deformed steels with electrical pulse heating was developed. The **dynamic recovery and recrystallization kinetics** behaviors on the plastic deformation with electrical pulse heating were observed by CTEM characterization. ANSYS finite element analysis of plastic deformation of steels with and without electro-pulsing heating was performed. I have systematically studied the **dislocations theory** in this period of research work time.

9.5 Preparation of Ni-based thin layers electro-magnetic waves shielding coating materials in a wide frequency range. (Sep 2006-Jun 2007)

7. Experimental Skills

- High familiarization with the theory and experimental methods for neutron and synchrotron x-ray scattering;
- High familiarization with the data analysis methods (Fit2d, PDFgetX2, PDFgetX3, batch processing software of WU-BESL, GSAS, DAVE etc.) for neutron and synchrotron x-ray scattering;
- Preparation of bulk metallic glasses, undercooled nano-structured alloys by fluxing techniques and as-cast methods (RF induction melting, Arc melting)
- Skillful operations and data analysis of CTEM, HRTEM, HAADF in STEM mode, EDX, EELS, OM, SEM, XRD, DSC, SPS, etc.
- High familiarization with TEM sample preparation of alloys (including BMGs) by Twin Jet Electro-polishing and Ion Miller Polishing methods

- Mechanical properties experiments in room temperature and high temperature
- Heat-treatment principles and processes designing
- The basic ANSYS finite element analysis of plastic deformation of metals
- The theory and method of MD simulation

8. Research Interests

- Microstructural kinetics of phase transformation in metals and alloys induced by temperature and pressure;
- Synthesis of BMGs and nanostructured alloys with unique physical and mechanical properties;
- Mechanisms of plasticity in bulk metallic glasses (BMGs) and nanostructured alloys with unique microstructure;
- structure evolution in metastable glass-forming metallic liquids during phase transitions;
- The application of advanced characterization techniques, such as in-situ neutron/synchrotron scattering and TEM, for complex materials study;
- In-situ study of phase transformations in energy storage materials.
- Engineering applications of advanced polymer-based composites.