KEY PUBLICATIONS

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Structure and Dynamics of Metallic Glasses

1. X. Y. Li, H. P. Zhang, S. Lan, D. L. Abernathy, C. H. Hu, L. R. Fan, M. Z. Li*, and **X.-L. Wang***, "Spatial correlation at the boson peak frequency in amorphous materials," *Nature Communications,* **17**, 860 (2026).
2. S. Lan*, L. Zhu, Z. D. Wu, L.n Gu, Q. H. Zhang, H. H. Kong , J. Z. Liu, R. Y. Song, S. N. Liu, G. Sha, Y. G. Wang, Q. Liu, W. Liu, P. Y. Wang, C. T. Liu, Y. Ren*, and **X.-L. Wang***, "A medium-range structure motif linking amorphous and crystalline states," *Nature Materials*, **20**, 1347–1352 (2021)
3. X. Y. Li, H. P. Zhang, S. Lan, D. L. Abernathy, T. Otomo, F. W. Wang, Y. Ren, M. Z. Li*, and **X.-L. Wang***, "Observation of High-Frequency Transverse Phonons in Metallic Glasses", *Physical Review Letters*, 124, 225902 (2020).
4. S. Lan, Y. Ren, X. Y. Wei, B. Wang, E. P. Gilbert, T. Shibayama, S. Watanabe, M. Ohnuma, and **X.-L. Wang***, "Hidden Amorphous Phase and Reentrant Supercooled Liquid in Pd-Ni-P Metallic Glasses," *Nature Communications* **8**, 14679 (2017); doi:10.1038/ncomms14679
   (This work solved a 40-year old scientific mystery. The story was covered widely in news media in English, Japanese, and Chinese. Examples:
   ScienceDaily, "Atomic 're-packing' behind metallic glass mystery"
   Phys.org, "Insights may lead to design and development of superior metallic alloys,"
   Hokkaido University, "40 年間謎とされてきたアモルファス合金の示差走査熱量測定に おける異常発熱の理由を中，米，豪，日の 4 カ国共同て初めて解明"
   NSFC, 我国青年学者发现非晶合金在晶化温度以下的多形性相变,
   Also featured in Nature Communications' collection series, Metallurgy)
5. D. Ma, A. D. Stoica, **X.-L. Wang***, Z. P. Lu, B. Clausen, D. W. Brown, "Moduli inheritance and the weakest link in metallic glasses," *Physical Review Letters*, **108**, 085501 (2012)
   (covered by News and Views, Nature Materials, 11, 275–276 (2012))
6. Y. Wu, D. Q. Zhou, W. L. Song, H. Wang, Z.Y. Zhang, D. Ma, **X.-L. Wang**, and Z. P. Lu, "Ductilizing Bulk Metallic Glass Composite by Tailoring Stacking Fault Energy," *Physical Review Letters*, 109, 245506 (2012).
7. D. Ma, A. D. Stoica, and **X.-L. Wang***, "Power-law scaling and fractal nature of the medium range order in metallic glasses," *Nature Materials*, **8**, 30-34 (2009).
8. L. Yang, M. K. Miller, **X.-L. Wang***, C. T. Liu, A. D. Stoica, D. Ma, J. Almer, and D. Shi, "Nano-scale solute partitioning in devitrified bulk metallic glass," *Advanced Materials*, **21**, 305-308 (2009)
   (featured on the cover).
9. **X.-L. Wang***, J. Almer, Y. D. Wang, J. K. Zhao, C. T. Liu, A. D. Stoica, D R. Haeffner, and W. H. Wang, "In-situ Synchrotron Study of Phase Transformation Behaviors in Bulk Metallic Glass Using Simultaneous X-ray Diffraction and Small Angle Scattering," *Physical Review Letters,* **91**, 265501 (2003).

Phase Stability and Deformation of High Entropy Alloys

1. L. Zhu, H. Y. He, M. Naeem, X. Sun, J. Qi, P. Liu, S. Harjo, K. Nakajima, B. Li*, and **X.-L. Wang***, "Antiferromagnetism and phase stability of CrMnFeCoNi high-entropy alloy," *Physical Review Letters*, **133**, 126701 (2024).
2. Bojing Guo, Dingcong Cui, Qingfeng Wu, Yuemin Ma, Daixiu Wei, Kumara LS R, Yashan Zhang, Chenbo Xu, Zhijun Wang, Junjie Li, Xin Lin, Jincheng Wang, **Xun-Li Wang**, Feng He, "Segregation-dislocation self-organized structures ductilize a work-hardened medium entropy alloy," *Nature Communications,* **16**, 1475 (2025).
3. L. Zhu, G. Li, W. Dong, J. Zhang, Y. Ma, H. He, S. Lan, Z. Wu, X. Li, T. Yang, and **X.-L. Wang***, "On the grain size dependence of competing deformation mechanisms in a CrCoNi medium entropy alloy", *Acta Materialia*, 289, 120907 (2025)
4. H.Y. He, M. Naeem, F. Zhang, Y.L. Zhao, S. Harjo, T. Kawasaki, B. Wang, X.L. Wu, S. Lan, Z.D. Wu, W. Yin, Y. Wu, Z.P. Lu, J.J. Kai, C.T. Liu, and **X.-L. Wang***, "Stacking Fault Driven Phase Transformation in CrCoNi Medium Entropy Alloy", *Nano Letters*, 21, 3, 1419–1426 (2021)
5. M. Naeem, H. Y. He, F. Zhang, H. L. Huang, S. Harjo, T. Kawasaki, B. Wang, S. Lan, Z. D. Wu, F. Wang, Y. Wu, Z. P. Lu, Z. W. Zhang, C. T. Liu, and **X.-L. Wang***, "Cooperative deformation in high-entropy alloys at ultralow temperatures," *Science Advances*, 6, eaax4002 (2020).
   This paper is featured in several news outlets, including
   Phys.org, "Multi-stage deformation process in high-entropy alloys at ultra-low temperatures revealed"
   Eureka! "Multi-stage deformation process in high-entropy alloys at ultra-low temperatures revealed"
   Japan Proton Accelerator Complex Press Release (in Japanese)
   極低温で現れる先進的合金の特異な変形メカニズムを解明
6. M. Naeem, H. He, S. Harjo, T. Kawasaki, W. Lin, J.J. Kai, Z. Wu, S. Lan, and **X.-L. Wang***, "Temperature-dependent hardening contributions in CrFeCoNi high-entropy alloy", *Acta Materialia*, 221, 117371 (2021).
7. Y. Wu, W. H. Liu, **X. L. Wang**, D. Ma, A. D. Stoica, T. G. Nieh, Z. B. He, Z. P. Lu, "In-situ neutron diffraction study of deformation behavior of a multi-component high-entropy alloy," *Applied Physics Letters*, 104, 051910 (2014).

In situ Deformation Study (excluding High Entropy Alloys)

1. A. Pramanick, **X.-L. Wang***, A. D. Stoica, C. Yu, Y. Ren, S. Tang, Z. Gai, "Kinetics of magnetoelastic twin-boundary motion in ferromagnetic shape-memory alloys," *Physical Review Letters*, 112, 217205 (2014).
2. T. Ungar, A. D. Stoica, G. Tichy, **X.-L. Wang**, "Orientation-dependent evolution of the dislocation density in grain populations with different crystallographic orientations relative to the tensile axis in a polycrystalline aggregate of stainless steel," *Acta Materialia*, 66, 251-261 (2014).
3. D. Ma, A. D. Stoica, **X.-L. Wang***, Z. P. Lu, B. Clausen, D. W. Brown, "Moduli inheritance and the weakest link in metallic glasses," *Physical Review Letters*, **108**, 085501 (2012)
   (covered by News and Views, Nature Materials, 11, 275–276 (2012))
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5. S. Cheng, A.D. Stoica, **X.-L. Wang***, Y. Ren, J. Almer, J.A. Horton, C.T. Liu, B. Clausen, D.W. Brown, P.K. Liaw, and L. Zuo, "Deformation cross-over: from nano to meso scales," *Physical Review Letters*, **103**, 035502 (2009).
(selected for inclusion in August 3 issue of Virtual Journal of Nanoscale Science & Technology)
6. I. Robertson, C. Schuh, J. Vetrono, N. Browning, D. Field, D. Juul-Jensen, M. Miller, I. Baker, D. Dunand, R. Dunin-Borkowski, B. Kabius, T. Kelly, S. Lorano-Perez, A. Misra, G. Rohrer, T. Rollett, M. Taheri, G. Thomson, M. Uchic, **X.-L. Wang**, G. Was, "Towards an integrated materials characterization toolbox," a viewpoint paper in *Journal of Materials Research*, **26**, 1341-1383 (2011).
7. Y.D. Wang*, H. Tian, A. D. Stoica, **X.-L. Wang***, P. K. Liaw, and J.W. Richardson, "Development of Large Grain-Orientation-Dependent Residual Stresses in a Cyclically-Deformed Alloy," *Nature Materials*, **2**, 103-106 (2003).
(covered by Materials Today, http://www.materialstoday.com/pdfs_6_3/research.pdf)

Neutron Scattering Instrumentation

1. G. L. Cai, Y. H. Li, Y. Fu, H. Yang, L. Mei, Z. Y. Nie, T. F. Li, H. Liu, Y. B. Ke, **X.-L. Wang**, J.-L. Brédas, M.-C. Tang, X. K. Chen, X. W. Zhan, and X. H. Lu, "Deuteration-enhanced neutron contrasts to probe amorphous domain sizes in organic photovoltaic bulk heterojunction films," *Nature Communications*, **15**, 2784 (2024)
2. X. Xia, T. K. Lau, X. Guo, Y. Li, M. Qin, K. Liu, Z. Chen, X. Z. Zhan, Y. Q. Xiao, P. F. Chan, H. Liu, L. H. Xu, G.. L. Cai, N. Li, H. M. Zhu, G. Li, Y. Zhu, T. Zhu, X. W. Zhan, **X.-L. Wang**, and X. H. Lu, "Uncovering the out-of-plane nanomorphology of organic photovoltaic bulk heterojunction by GTSAXS," *Nature Communications*, **12**, 1-10 (2021).
3. J. Xu, Y. Xia, Z. Li, H. Chen, **X.-L. Wang**, Z. Sun, and W. Yin, "Multi-physics instrument: Total scattering neutron time-of-flight diffractometer at China Spallation Neutron Source", *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, 165642 (2021).
4. H. S. Chen*, and **X.-L. Wang***, "China's first pulsed neutron source," *Nature Materials*, **15**, 689 – 691 (2016).
5. **X.-L. Wang***, T. M. Holden, G. Q. Rennich, A. D. Stoica, P. K. Liaw, H. Choo, and C. R. Hubbard, "VULCAN – The Engineering Diffractometer at the SNS," *Physica B*, **385-386**, 673-675 (2006).
6. T. E. Mason, D. Abernathy, I. Anderson, J. Ankner, T. Egami, G. Ehlers, A. Ekkebus, G. Granroth, M. Hagen, K. Herwig, J. Hodges, C. Hoffmann, C. Horak, L. Horton, F. Klose, J. Larese, A. Mesecar, D. Myles, J. Neuefeind, M. Ohl, C. Tulk, **X.-L. Wang**, J. Zhao, "The spallation neutron source in Oak Ridge: A powerful tool for materials research," *Physica B: Condensed Matter*, 385-386, 955-960 (2006).
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Magnetism

1. L. Zhu, H. Y. He, M. Naeem, X. Sun, J. Qi, P. Liu, S. Harjo, K. Nakajima, B. Li*, and **X.-L. Wang***, "Antiferromagnetism and phase stability of CrMnFeCoNi high-entropy alloy," *Physical Review Letters*, **133**, 126701 (2024).
2. A. Pramanick*, **X.-L. Wang***, A. D. Stoica, C. Yu, Y. Ren, S. Tang, and Z. Gai, "Kinetics of magnetoelastic twin boundary motion in ferromagnetic shape memory alloys," *Physical Review Letters*, **112**, 217205 (2014).
3. Z. Wang, **X.-L. Wang**, J. A. Fernandez-Baca, D. C. Johnston, and D. Vaknin, "Antiferromagnetic Ordering and Paramagnetic Behavior of Ferromagnetic Clusters in $BaCuO_{2+x}$," *Science*, **264**, 402-404 (1994).
4. **X. L. Wang**, C. Stassis, D. C. Johnston, T. C. Leung, J. Ye, B. N. Harmon, G. H. Lander, A. J. Schultz, C. K. Loong, J. M. Honig, "Neutron-diffraction study of the antiferromagnetic form factor of La2NiO4," *Physical Review B*, 45, 5645-5653 (1992).
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Residual Stress Measurements and Other Applications

1. **X.-L. Wang***, K. An, L. Cai, Z. Feng, S. E. Nagler, C. Daniels, K. J. Rhodes, D. L. Wood, III., A. D. Stoica, H. D. Skorpenske, C. Liang, W. Zhang, Y. Kim, Y. Qi, and S. J. Harris, "Visualizing the chemistry and structure dynamics in Li-ion batteries by in-situ neutron diffraction," *Scientific Report*, **2**, 747 (2012).
2. W. Woo, Z. Feng, **X. L. Wang**, D. W. Brown, B. Clausen, K. An, H. Choo, C. Hubbard, S. A. David, "In situ neutron diffraction measurements of temperature and stresses during friction stir welding of 6061-T6 aluminium alloy," *Science and Technology of Welding and Joining*, 12, 298-303 (2007).
3. **X.-L. Wang**, "Application of neutron diffraction to engineering problems," *JOM*, March, 53-58, 2006.
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