

HKIAS Distinguished Lecture Series on Physics

Structure and Dynamics of Metallic Glass – Atomistic Insights from Neutron and Synchrotron Scattering Experiments

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Abstract

The structure and dynamics of glassy materials have long been identified as one of the grand scientific challenges. Glasses are obtained by rapid quenching from the liquid state, bypassing atomic ordering on cooling. Therefore, in glassy materials, there is no long-range order. However, ordered structures exist at short-range (2-5 Å), medium-range (5-20 Å), and even longer length scales. Glasses differ from their crystalline counterparts not only from the structural point of view, but also in many of the physical properties such as thermal conductivity, heat capacity, and mechanical properties. Neutron or synchrotron X-ray scattering are powerful techniques to study the structure and dynamics of materials. In this talk, I will discuss atomistic insights obtained by these advanced characterization techniques on the structure, phase transition, and phonon dynamics of metallic glass, an exotic kind of glassy structure materials. The role of medium-range order and cluster connectivity will be highlighted. Scientific opportunities at China Spallation Neutron Source in Dongguan will also be discussed.

Biography

Professor Xun-Li Wang is Head and Chair Professor at the Department of Physics, City University of Hong Kong. Prior to coming to Hong Kong in 2012, he had worked at Oak Ridge National Laboratory in the US, rising through the ranks to Distinguished Research Staff.

Professor Wang conducts research at the interface between condensed matter physics and materials science. He applies state-of-the-art neutron and synchrotron scattering techniques to study phase transformation and deformation in advanced materials. He has also made major contributions to the development of instrumentation that have enabled these seminal studies.

Professor Wang received his Ph.D. from Iowa State University and B.S. from Peking University, both in Physics. He is an elected Fellow of the American Physical Society (2010), American Association for the Advancement of Science (2017), and Neutron Scattering Society of America (2020). He is also a recipient of Lee Hsun Lectureship from Chinese Academy of Sciences (2018) and Croucher Senior Research Fellowship (2021).



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