Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Density Scaling of Glassy Dynamics and Dynamic Heterogeneities in Glass-forming Liquids.[1] YUAN-CHAO HU, Department of Mechanical and Biomedical Engineering, City Univ of Hong Kong; Institute of Physics, Chinese Academy of Sciences, YONG YANG, Department of Mechanical and Biomedical Engineering, City Univ of Hong Kong, WEI-HUA WANG, Institute of Physics, Chinese Academy of Sciences — The discovery of density scaling in strongly correlating systems is an important progress for understanding the dynamic behaviors of supercooled liquids. Here we found for a ternary metallic glass-forming liquid, it is not strongly correlating thermodynamically, but its average dynamics, dynamic heterogeneities and static structure are still well described by density scaling with the same scaling exponent γ. As an intrinsic material constant stemming from the fundamental interatomic interactions, γ is theoretically predicted from the thermodynamic fluctuations of potential energy and the virial. Although γ is conventionally understood merely from the repulsive part of the inter-particle potentials, the strong correlation between γ and the Grneisen parameter up to the accuracy of the Dulong-Petit approximation demonstrates the important roles of anharmonicity and attractive force of the interatomic potential in governing glass transition of metallic glass-formers. The supercooled dynamics and density scaling behaviors will also be discussed in model glass-forming liquids with tunable attractive potentials to further quantify the nonperturbative roles of attractive interactions.

[1]We acknowledge the support from "Peter Ho Conference Scholarships" of City University of Hong Kong

Yuan-Chao Hu
City Univ of Hong Kong

Date submitted: 16 Oct 2016 Electronic form version 1.4