Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

High-density aerogels with ultralow sound velocity: Microstructure is a key parameter determining the sound velocity[1] AI DU, BIN ZHOU, YANG SHEN, QIUJIE YU, JUN SHEN, Tongji University — Aerogels are more and more regarded as a new state of matter nowadays because of its diverse chemical compositions and unique properties which could fill the gap between condensed matter and gas-state matter. Among the properties, the ultralow sound velocity in the aerogels (lower than that in the air) is of great interests. J. Fricke's group studied many kinds of aerogels with different compositions and found that the sound velocity was mainly influenced by the density. Thus they obtained the lowest sound velocity result ($\sim$ 100 m/s) in a low-density silica aerogel medium ($\sim$ 0.05 g.cm^{-3}). Here we studied the acoustical properties of the aerogels with the similar high density (about 1.3 g.cm^{-3}) but different skeleton structure (nano-, micro- or nano-/micro-structured) by adjusting the phase separation mode. The sound velocities of all the aerogels are below 300 m.s^{-1}, among which micro-/nano- structured aerogel exhibits lowest longitudinal wave velocity (below 80 m.s^{-1}). Further structural studies indicated that the hierarchical arrangement of microstructure is the key parameter determining the sound velocity besides the density.

[1]This work was supported by the National Natural Science Foundation of China (51102184, 51172163), National High-tech R&D Program of China (863 Program, 2013AA031801) and National Science and Technology Support Program (2013BAJ01B01).

Ai Du
Tongji University

Date submitted: 11 Nov 2013 Electronic form version 1.4