Supporting Information

Mizuno et al. 10.1073/pnas.1409490111

SI Text

In what follows we report additional data, referring to the (100) and (111) directions in the wave vector space, for both longitudinal and transverse dynamical structure factors. These data are shown for completeness; the main text contains all results needed to support our conclusions.

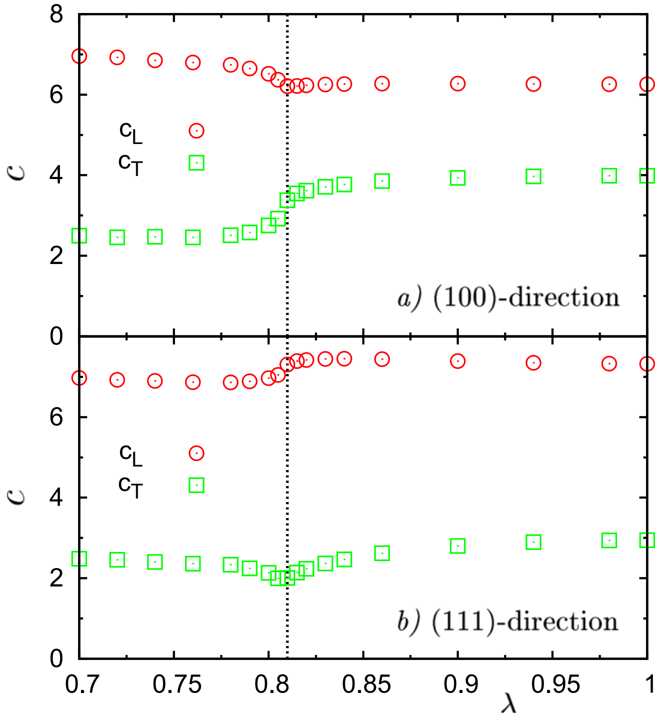

Fig. S1. λ dependence of the longitudinal (L) and transverse (T) macroscopic sound velocities (A) in the (100) direction and (B) in the (111) direction. These data have been calculated from the effective elastic moduli, $K + 4G_p/3$, G_s in the (100) direction and $K + 4G_s/3$, $(2G_p + G_s)/3$ in the (111) direction. The vertical dashed line indicates the transition point $\lambda = \lambda^* \simeq 0.81$. Note that in the deep isotropic amorphous state $\lambda = 0.7$; c_L and c_T assume the same values in the three directions, (100), (110), and (111).

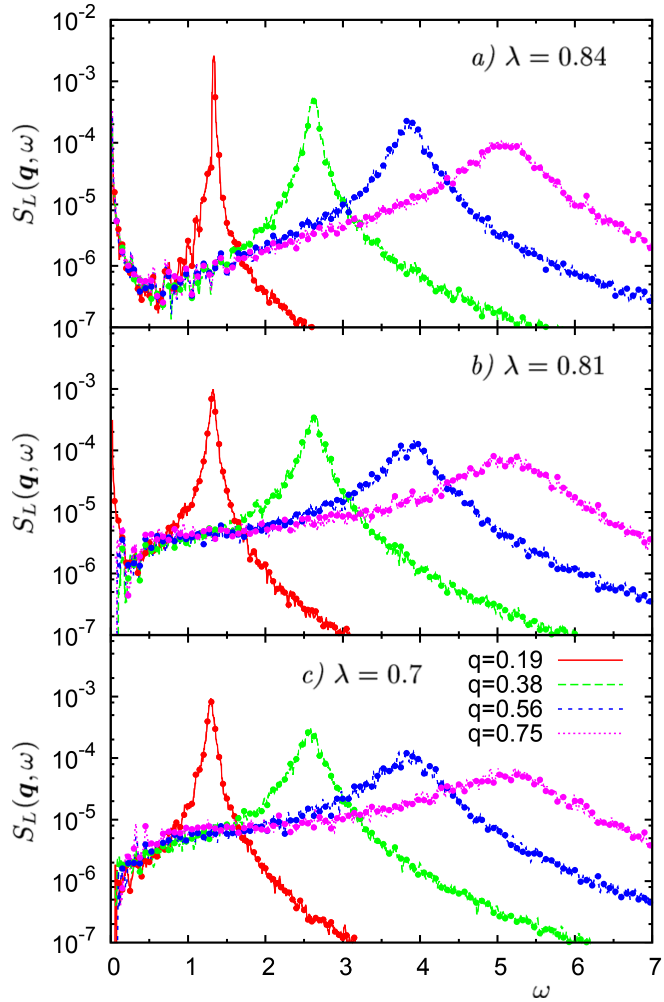

Fig. S2. Longitudinal dynamic structure factors, $S_L(\vec{q},\omega)$, at the indicated values of the wave vector $\vec{q}$ in the (110) direction, calculated from Eq. **1** in the main text. Three values of λ are shown, in a defective crystal state (*A*), at the amorphisation transition (*B*), and in the fully developed glassy phase (*C*). Contrary to the case of the transverse dynamic structure factors $S_T(\vec{q},\omega)$ shown in Fig. 2 in the main text, $S_L(\vec{q},\omega)$ features a single Brillouin peak even in the lattice cases.

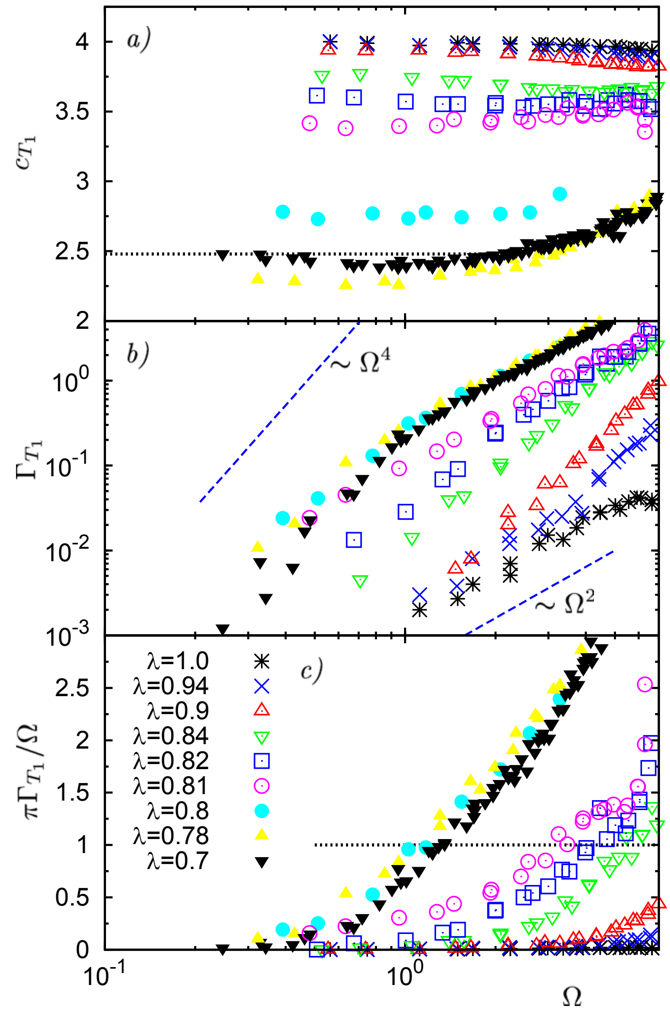

Fig. S3. Spectroscopic parameters calculated from the transverse dynamic structure factors $S_T(\vec{q},\omega)$. (*A*) Transverse phase velocity $c_{T_1}(\Omega) = \Omega_{T_1}(q)/q$ and (*B*) broadening $\Gamma_{T_1}(\Omega)$ for the T_1 excitations in the (110) direction at the indicated values of λ. The horizontal dashed line in *A* corresponds to the macroscopic limit of the sound velocity at $\lambda = 0.7$. The dashed lines $\propto \Omega^2$ and $\propto \Omega^4$ in *B* are guides for the eye. (*C*) The ratio $\pi\Gamma_{T_1}(\Omega)/\Omega$ is plotted as a function of Ω. The value Ω for which $\pi\Gamma_{T_1}(\Omega)/\Omega = 1$ (horizontal line) defines the Ioffe-Regel limit $\Omega^{IR}_{T_1}$.

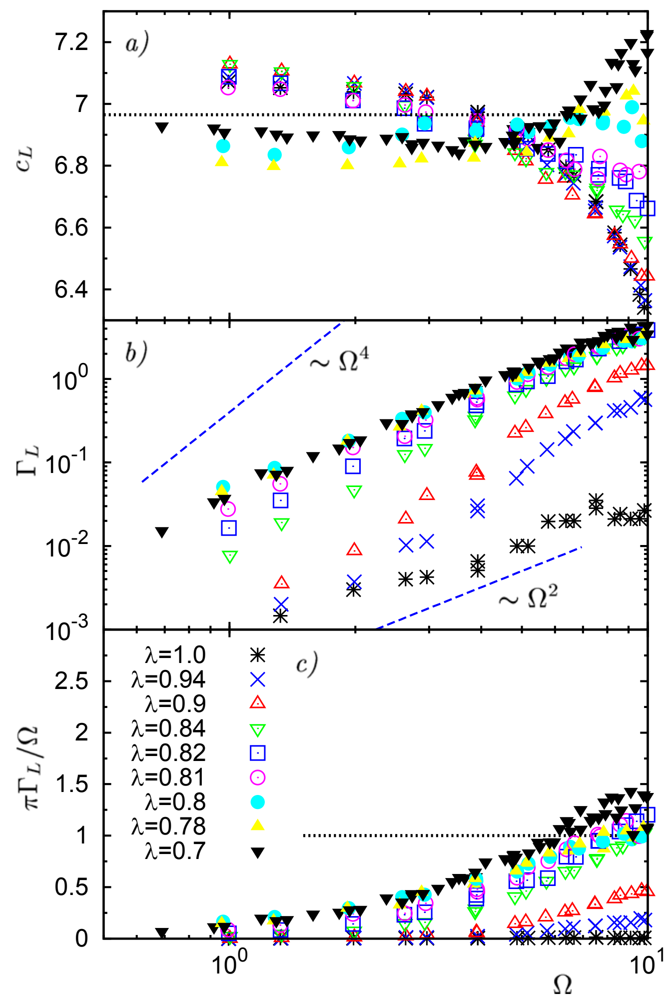

Fig. S4. Spectroscopic parameters calculated from the longitudinal dynamic structure factors $S_L(\vec{q},\omega)$. (*A*) Longitudinal phase velocity $c_L(\Omega) = \Omega_L(q)/q$ and (*B*) broadening $\Gamma_L(\Omega)$ for the *L* excitations in the (110) direction at the indicated values of λ. (*C*) The ratio $\pi\Gamma_L(\Omega)/\Omega$ is plotted as a functions of Ω (also see the caption for Fig. S3).