Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Hypersonic Phononic Crystal Based on 2D Single Crystalline Nanoporous Alumina AKIHIRO SATO, Max Planck Institute for Polymer Research, YAN PENNEC, Institut dElectronique, de Microelectronique et de Nanotechnologie, TAKASHI YANAGISHITA, Tokyo Metropolitan University, BAHRAM DJAFARI-ROUHANI, Institut dElectronique, de Microelectronique et de Nanotechnologie, FYTAS GEORGE, F.O.R.T.H Institute of Electronic Structure and Laser Technology, WOLFGANG KNOLL, Max Planck Institute for Polymer Research, HIDEKI MASUDA, Tokyo Metropolitan University — Periodic nanocomposite media consisted of alumina matrix and infiltrated cylindrical nanopores exhibit rich elastic wave propagation behaviour including the localization of phonons, anisotropic propagation and the formation of phononic band gaps at GHz frequencies. We have examined the translational symmetry dependence of dispersion relations on 2D single crystalline phononic crystals based on nanoporous alumina using Brillouin light scattering. The propagation of elastic waves is significantly different between native and filled with fluids alumina matrix. For the latter, the dispersion relations become independent of the propagation direction, as opposed to the native alumina scaffold. Theoretical band diagrams and the displacement fields describe well the experimental results.

Akihiro Sato
Max Planck Institute for Polymer Research

Date submitted: 19 Nov 2008 Electronic form version 1.4