Abstract Submitted
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Anisotropic Phonon Propagation in Nanoporous Alumina[1] AKIHIRO SATO, Max Planck Institute for Polymer Research, GEORGE FYTAS, F.O.R.T.H Institute of Electronic Structure and Laser Technology, BAHRAM DJAFARI-ROUHANI, YAN PENNEC, Institut d'Electronique, de Micro-électronique et de Nanotechnologie, MARTIN STEINHART, Max Planck Institute of Microstructure Physics, WOLFGANG KNOLL, Max Planck Institute for Polymer Research — Self-ordered nanoporous alumina membranes contain highly ordered hexagonal arrays of cylindrical holes. Phononic crystals based on nanoporous alumina with various porosities represent a composite medium for rich elastic wave propagation phenomena due to their periodicity and acoustic impedance contrast between alumina and infiltrated materials. It allows the manipulation of the high frequency acoustics as probed by Brillouin light scattering. In-plane and out-of-plane (perpendicular to the holes) propagation of the elastic waves are distinctly different. While the former reveals an effective medium and localization behavior, the latter selects the medium filling the holes. Band structure theoretical calculations provide a semiquantitative description of the new experimental findings.

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Akihiro Sato
Max Planck Institute for Polymer Research

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