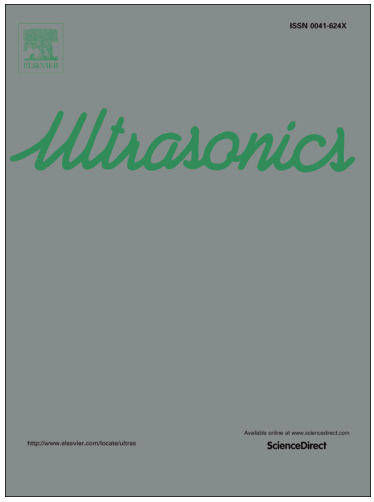

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Evidence of a broadband gap in a phononic crystal strip

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Abstract

We experimentally demonstrate a very large ultrasonic band gap in a one-dimensional phononic crystal. The structure consists of periodic tungsten pillars fixed to a tailored silicon strip with a layer of epoxy. Combining local resonances and Bragg scattering, the gap ranges from 450 kHz to 1250 kHz, which corresponds to a gap-to-midgap ratio of 94%, and the attenuation exceeds 35 dB with only three periods. Numerical calculations with the Finite Element Method are performed to support the analysis and provide a better understanding of the behavior of the structure. In particular, the role of the thin layer of epoxy is studied and is shown to have a strong influence on the dispersion. This phononic structure with a very large band gap can be considered as a new tool to design acoustic devices with high performances.

Keywords: Phononic strip, local resonances, large band gap

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