convincing coincidence is found with respect to the geometrical parameters. The honeycomb lattice appears to be the one auguring the wider phononic bandgaps, although no omnidirectional photonic bandgap is found outside the light cone. Finally, it is found that the hexagonal (or triangular) lattice supports phoxonic bandgaps: it promotes simultaneously the widest photonic bandgaps for the even modes and provide at the same time odd phononic bandgaps. The geometrical parameters are identified around reduced thickness of *0.6* and reduced inclusion radius of *0.3*; considering telecommunication optical wavelength, the phonon frequencies fall in the GHz range.

These outcomes will promote the design of phoxonic $LiNbO_3$ slab devices for experimental investigations.

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