

## A soft 3D acoustic metafluid with dual-band negative refractive index

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Spherical silica xerogels are efficient acoustic Mie resonators. When these inclusions are dispersed in a fluid matrix, the final material may display a negative acoustic refractive index upon a set of precise constraints concerning the material properties, concentration, size and dispersity of inclusions. Because xerogels may sustain both pressure and shear waves (while only longitudinal waves propagate in the matrix), several bands with negative index can be tailored. Here we quantify theoretically such a possibility and demonstrate it experimentally by engineering calibrated particles of silica xerogels using microfluidics. We find that Poisson's ratio of the inclusions is a key descriptor of these 3D metafluids.