ACOUSTICS GROUP

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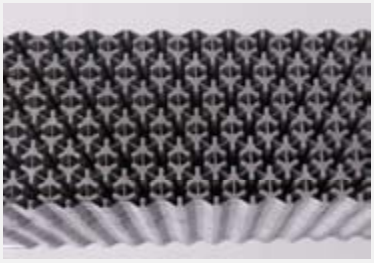
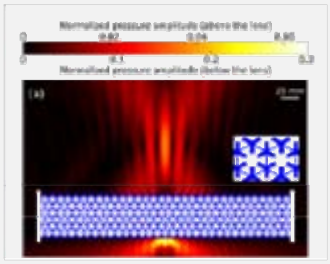
Acoustics group develops research based on its expertise on phononic crystals and metamaterials, transduction and numerical methods, with the following main results:

PHONONIC CRYSTALS: NEGATIVE REFRACTION

Metallic structure that exhibits an excellent index matching with water
➔Focusing of acoustic waves with a resolution close to the diffraction limit
➔applications as field copier



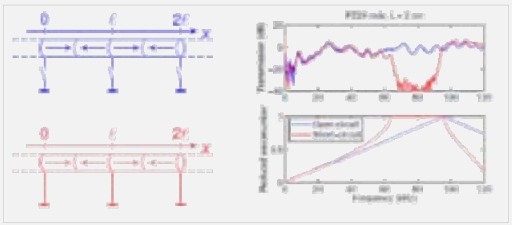


PHONONIC CRYSTALS: TUNABILITY

Piezoelectric phononic crystals : electric charge band gap induced by free electric charges on the electrodes

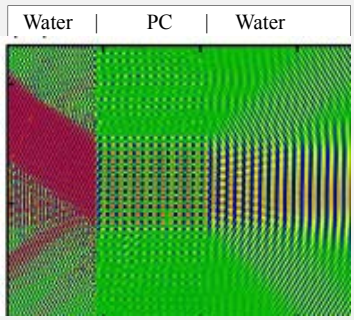
The band gap is highly tunable by using electrical capacitances

➔ Development of tunable and reconfigurable active phononic crystals and metamaterials



PHONONIC CRYSTALS: COLLIMATION

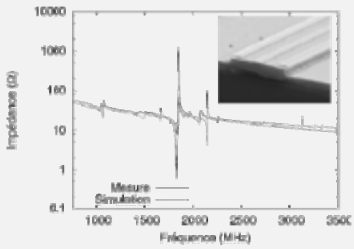
Square array of steel rods in epoxy



- Plane wave of specific frequency at oblique incidence (numerical simulations)
- Self-collimation of the phonon flux inside the phononic crystal
- Application to thermal conductivity management of nanostructured devices, directional sources, acoustic logic gates

RF MEMS

Guided Acoustic Wave (GAW) RF piezoelectric resonator atop of Bragg mirror

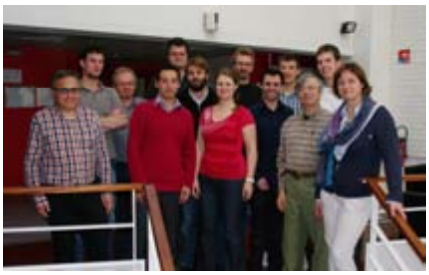


- Different frequencies (determined by resonator width) on the same chip
- Co-integration with BAW resonator providing simultaneously wide band (BAW) and narrow band (GAW) RF filtering

PARTICIPATION TO ANR PROJECTS :

As coordinator :
SUPREME (ANR blanc 2009-2011)
MIRAGES (ANR blanc 2013-2015)

As participant :
OVMI (ANR jeune chercheur 2006-2008)
EVA (ANR contenu et interaction 2009-2013)
HYPERCAMPUS (ANR matériaux et procédés 2011-2013)



COLLABORATIONS

SinapTec, DGA, CEDRAT, THALES, ONERA, PENNSTATE, UNIVERSITY OF MANITOBA, THE UNIVERSITY OF ARIZONA, leti, Constellium, ST, NUWC, UNIVERSITAT POLITÈCNICA DE VALÈNCIA, RUTGERS, DCNS, iemn Institut d'Électronique, de Microélectronique et de Nanotechnologie, cnrs, Université Lille1, Université de Valenciennes et du Hainaut-Cambrésis, ISEN école d'ingénieurs, RENATECH