

**Research Topic:** Phononic SAW Structures and Devices for Advanced Passive Wireless Systems

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**Summary:**

It will be the purpose of this research to explore theory, analysis and experimental work on SAW phononic reflector structures and devices and their implementation for sensors and communication systems. The term SAW phononic structures is used since the structures are composed of a-periodic, pseudo-periodic or pseudo-random structures that are designed to affect the propagation of surface acoustic waves in a manner similar to the periodic potential in a semiconductor that affects the electron's energy in allowed or forbidden bands based on the crystal material.

It is proposed that reflector structures will be used to implement the phononic structures. SAW transducer structures could also be used, but will not be studied in detail in order to focus on a single topic. When a SAW travels under a reflective grating, the wave is reflected at the synchronous, or Bragg, frequency. The synchronous reflection occurs when the reflector width is approximately a quarter wavelength at the Bragg frequency.

The initial approach for the phononic structures to be researched will use the concept of orthogonal frequencies that allows the building of one dimensional a-periodic or pseudo-periodic reflective structures.

This approach can be used for development of passive wireless temperature, pressure, hydrogen, e.t.c. sensors for space applications and various consumer applications.