Contribution ID: **1338** Type: **Poster (Student, In Competition) / Affiche (Étudiant(e), inscrit à la compétition)**

A Phononic Crystal Waveguide for Surface Acoustic Waves

Tuesday 14 June 2016 19:04 (2 minutes)

Surface acoustic waves (SAWs) on semiconductors, such as gallium arsenide (GaAs), are able to control quantum processes. SAW devices are augmented with phononic crystal waveguides to have fine control of the acoustic path. A phononic crystal in a GaAs substrate is produced by wet etching a square lattice array of void inclusions with an L1 defect. GaAs by its piezoelectricity, is suited for SAW generation via interdigitated transducers (IDTs). Initially, an IDT design must allow for determination of the phononic crystal mode frequency which is difficult to predict exactly. IDTs with uniform adjacent electrode overlap produce a narrow SAW bandwidth, which is even narrower with additional electrodes. Such low bandwidth is not practical for probing the mode frequency since it is unlikely to coincide. However, adjacent electrode overlap and a large number of electrodes are necessary to achieve appreciable SAW amplitude on GaAs; hence an optimized IDT is necessary for sufficient bandwidth and amplitude. Apodized IDTs with varying electrode overlap are developed for large SAW bandwidth and amplitude to probe the waveguide mode frequency. Once the mode is determined, focusing, narrowband IDTs on GaAs are then utilized for high power excitation of the phononic crystal mode frequency. The SAW vertical displacement amplitude is measured with surface scanning Sagnac interferometry as the SAW interacts with the phononic crystal. Spatial and frequency mapping of the SAW vertical displacement amplitude is analyzed to determine transmission and modal qualities of the phononic crystal waveguide.

Primary author: Mr MUZAR, Edward (Queen's University)

Co-authors: Ms AZODI AVAL, Golnaz (Queen's University); Dr STOTZ, James (Queen's University)

Presenter: Mr MUZAR, Edward (Queen's University)

Session Classification: DCMMP Poster Session with beer / Session d'affiches, avec bière DPMCM

Track Classification: Condensed Matter and Materials Physics / Physique de la matière condensée et matériaux (DCMMP-DPMCM)