

# BENEMÉRITA UNIVERSIDAD AUTÓNOMA DE PUEBLA



INSTITUTO DE FÍSICA  
“Luis Rivera Terrazas”



SEMINARIO  
“DR. JESUS REYES CORONA”



## “Porous silicon as a novel acoustic material for BAW devices”

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Materials with low acoustic impedance are important for bulk-acoustic-wave (BAW) devices. In solidly mounted resonator (SMR) BAW devices the ratio between acoustic impedances of ‘high’ and ‘low’ materials determine how many layer-pairs a Bragg reflector must have to achieve a desired high reflectivity. High impedance materials for reflectors such as tungsten are readily available and they have become an essential ingredient in high-performance Bragg reflectors. Tungsten is relatively easy to process and the cost of raw material is low. For the low impedance layers SiO<sub>2</sub> is widely used. SiO<sub>2</sub> deposited at temperatures below 500° C has an acoustic impedance of about 13 Mrayl. Carbon- and flourine-doped-SiO<sub>2</sub> show a potential to reduce acoustic impedance substantially as do a number of polymers. Acoustic losses in low impedance materials tend to increase as impedance decreases and manufacturing can be very challenging. Porous Si is a novel material for acoustics. Porosity determines mass density and acoustic velocity and it can be tailored in a wide range. The layer(s) are a result of electro-chemical etching of bulk-Silicon rather than thin film deposition. The etch process can be controlled to modify porosity and to create structures with gradually changing acoustic impedance, or even periodically varying acoustic impedance. The objective of this talk is to discuss the advantages and disadvantages of porous silicon as an acoustic material.

**Auditorio-IFUAP**  
**Viernes 31 de Mayo de 2013**  
**13:00 Hrs.**