



Departamento de  
Física de la  
Materia Condensada  
Universidad Zaragoza

SEMINARIOS 2019

## Gustau Catalán

*ICREA and Institut Català de Nanociència i Nanotecnologia (ICN2), Barcelona*

### “Flexoelectricity: from bent barium titanate to broken bones”

Piezoelectric materials are characterized by their ability to generate an electrical polarization in response to a deformation. In some piezoelectrics, the sign of this electrical polarization can be switched by an external voltage; these are called ferroelectrics and have many practical uses, including ferroelectric memories.

Piezoelectric materials are rare, and ferroelectric materials are rarer still. In contrast, flexoelectricity is a universal property of all materials. Flexoelectricity couples electrical polarization not to strain but to strain gradients, and it can be found in virtually all non-metallic materials: from insulators to semiconductors, and from ceramics and polymers to bones. In addition, this property is not incompatible with piezoelectricity, and the combination of the two leads to new functionalities that do not exist on their own.

In this talk, after a general introduction to the main concepts of ferroelectricity, piezoelectricity and flexoelectricity, I will present recent and eye-catching results from our laboratory in the area of flexoelectricity. These will include the existence and consequences of flexoelectricity in semiconductors, the use of flexoelectricity to switch crack propagation with a voltage in ferroelectrics, and the role of flexoelectricity in the self-repair of our own bones.

Prof. Catalan is an ICREA Research Professor at the Catalan Institute of Nanoscience and Nanotechnology (ICN2) in Barcelona. Previously he worked at Cambridge, Groningen and Belfast –where he did his PhD. He is an expert in the physics of oxides at the nanoscale, with an emphasis on ferroelectrics and multiferroics. Some of his best known works concern the properties of domain walls (so-called domain wall nanoelectronics) and flexoelectricity. Flexoelectricity was the subject of the ERC grant with which he set up his specialized laboratory at ICN2, and will be the main topic of his talk.

Con la colaboración de:



Facultad de Ciencias  
Universidad Zaragoza

7 de Junio (viernes)

LUGAR: SALA DE GRADOS DE LA  
FACULTAD DE CIENCIAS

HORA: 12:30