



### VALUE PROPOSITION

Avoid MEMS device malfunctions and reduced reliability, while increasing accuracy and resolution of electrostatic actuation devices.

### MARKET

Electrostatic actuation devices such as RF switches

### STATUS

- PCT/EP2014/076052 in 2014

### OPPORTUNITY

Licensing Opportunity

### CONTACT

Dr Karl Quinn

ICT Case Manager

Technology Transfer

t: +353 1 716 3728

e: karl.quinn@ucd.ie

### INVENTORS

- Dr. Diarmuid O'Connell

- Dr. Elena Blokhina

- Prof Orla Feely

*University College Dublin*

- Dr. Manuel Dominguez-Pumar

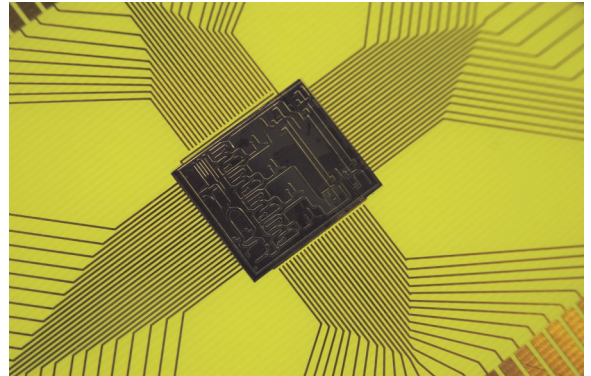
- Dr. Joan Pons-Nin

- Dr. Sergi Gorreta

*Universitat Politècnica de Catalunya*

## Control Malfunctions and Reliability caused by Parasitic Electrostatic Force in MEMS

The accumulation of charge in the dielectric of a MEMS (Micro Electro Mechanical Systems) device results in a parasitic source of electrostatic force which, if uncontrolled, can lead to device malfunction and permanent stiction that negatively impacts on reliability.



### Technology Description

This dielectric charge accounts for a number of reliability issues in electrostatically actuated MEMS and hence is a major barrier to the commercialisation of many such devices; as in the case of RF switches. Researchers from UCD and UPC have developed this novel control method that improves the accuracy and resolution of all devices that use electrostatic actuation.

### How It Works

This solution provides a feedback control method that periodically monitors the charge accumulated in the dielectric material of a MEMS device and subsequently applies an actuation signal such that the amount of dielectric charge can be controlled.

The design of a smart actuation/sensing is based on the 'quasi-differential' capacitance that is used as an indirect measurement of the charge. This actuation scheme allows for the implementation of the method on MEMS suffering from up and down variations on the C-V curve, which is the majority of real devices.

### Benefits

- Avoids MEMS device malfunction
- Avoids reductions in MEMS reliability due to permanent stiction
- Useful for all devices that use electrostatic actuation
- Improves accuracy and resolution of these devices