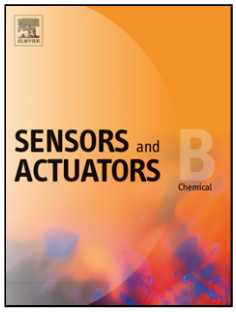

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ASYMMETRIC ENHANCED SURFACE INTERDIGITATED ELECTRODE CAPACITOR WITH TWO OUT-OF-PLANE ELECTRODES

Almudena Rivadeneyra[1], José F. Salmerón[1], Manuel Agudo-Acemel[2], Luis Fermín Capitan-Vallvey[2], Juan A. López-Villanueva[3] and Alberto J. Palma[3,*]

[1] Institute for Nanoelectronics, Technische Universität München, DE-80333, Munich, Germany
[2]ECsens, Departamento de Química Analítica, Facultad de Ciencias Universidad de Granada, E-18071, Granada, Spain
[3]ECsens, Departamento de Electrónica y Tecnología de Computadores, ETSIIT Universidad de Granada, E-18071, Granada, Spain

(e-mail: arivadeneyratorres@nano.ei.tum.de; jfsalmeron@ nano.ei.tum.de; manuelagudo@ugr.es; jalopez@ugr.es; lcapitan@ugr.es; ajpalma@ugr.es)
*Corresponding author: ajpalma@ugr.es Tel.: +34958242302 Fax: +34958242000

Highlights

- *New modelled and fabricated structure for capacitive sensors*
- *High increase in the bulk capacitance and sensitivity*
- *Feasibility of manufacturing by printing techniques on flexible substrates*

***Abstract*— This work presents a study of high-performance capacitive sensors based on a novel design of interdigitated electrode structure. In the proposed layout, electrodes are placed out of plane and the bottom electrode is a mixed interdigitated-planar plate electrode. Thanks to this layout, the sensor sensitivity is significantly enhanced. This structure has been characterized as humidity sensor manufactured by printing techniques on a flexible substrate. In particular, the sensitive layer is made of cellulose acetate butyrate deposited by screen printing, using silver ink to define the interdigitated electrodes. The capacitance is in the range of hundreds of pF with an area of 95.5 mm^2 at ambient conditions. The response of this sensor shows a sensitivity substantially dependent on the frequency but this sensitivity is considered to be enough to use this device as capacitive sensor in the whole range of frequency studied, for example 5 pF/%RH at 1 MHz. Further characterization was carried out to study the reliability of the manufacturing process and to measure the effect of temperature in the**