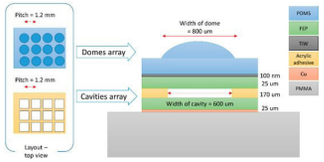
## Selected Paper

DOI:10.3390/electronics11152329

### Pyroelectrically Charged Flexible Ferroelectret-Based Tactile Sensor for Surface Texture Detection

*Authors: Edoardo Sotgiu, Pedro González-Losada, Rui M. R. Pinto, Hao Yang, Mohammadmahdi Faraji and K. B. Vinayakumar*

Abstract: Texture detection is one of the essential features requested for artificial tactile sensing to push the demand for flexible low-cost tactile sensors in the robotics sector. In this manuscript, we demonstrate the ability of a ferroelectret-based pressure sensor together with a patterned elastomer layer to detect surface textures. The ferroelectret sensor was fabricated using fluorinated ethylene propylene (FEP) sheets bonded with a patterned adhesive layer to create cavities, integrated with the elastomer bumped surface, and finally charged using a pyroelectric method developed by our group. The ferroelectret-based sensor showed a linear response to the applied force in the range of 0.5 to 2 N, a piezoelectric coefficient of 150.1 ± 3.2 pC/N in the range of 10–80 Hz, and a flat dynamic response in the range of 10–1000 Hz. The tactile sensing characterization of the sensor, performed at different scanning speeds (10 to 30 mm/s) and gratings with different periodicities (0 to 0.8 mm), showed that the fundamental frequencies observed ranged from 12 Hz to 75 Hz, as expected from the model. These results lay the foundation for the adoption of such sensors in different applications that need fine tactile information, such as an autonomous or teleoperated robotic hand, prostheses, and wearable devices.

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# Section Flexible Electronics

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## Section Information

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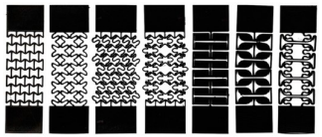
## Selected Papers

DOI:10.3390/electronics12010018

### Behavior of 3D Printed Stretchable Structured Sensors

*Authors: Eugene Kim, Seyedmeysam Khaleghian andAnahita Emami*

Abstract: Piezoresistive structures inspired by serpentines, auxetic, and kirigami arrangements have demonstrated good flexibility and sensitivity under tension. Piezoresistive structures display optimal performance when the characteristics entail reliable stretchability and repeatability. These structures can be implemented as wearable sensors by compressing and elongating the conductive nanocomposites to vary the flow of electrons and to provide resistance change. To guarantee the reliability of these structures for strain sensing, it is important that the resistance change in these structures remains constant under repeated loads. In this study, the performance of different piezoresistive structures under cyclic tensile load is investigated and compared. Based on the performance of different types of structures, novel hybrid structures have been also proposed to design for both high stretchability and sensitivity of piezoresistive sensors. All the structures were tested with position limits rather than a fixed force to avoid permanent deformation. First, small position limits were used to determine Young's Modulus, then a 10-cycle tensile test with larger position limits was used to further study the electromechanical behavior of different piezoresistive structures under larger deformation and repetition. Finally, the gage factor was derived for all the studied structures, and they were re-categorized based on properties' similarities.



DOI:10.3390/electronics11244085

### Effect of Large Uniaxial Stress on the Thermoelectric Properties of Microcrystalline Silicon Thin Films

*Authors: Edwin Acosta, Vladimir Smirnov, Peter S. B. Szabo, Christian Pillajo, Erick De la Cadena and Nick S. Bennett*

Abstract: This study reports on the behaviour of the thermoelectric properties of n- and p-type hydrogenated microcrystalline silicon thin films (μc-Si: H) as a function of applied uniaxial stress up to ±1.7%. μc-Si: H thin films were deposited via plasma enhanced chemical vapour deposition and thermoelectric properties were obtained through annealing at 200 °C (350 °C) for n-(p-) type samples, before the bending experiments. Tensile (compressive) stress was effective to increase the electrical conductivity of n-(p-) type samples. Likewise, stress induced changes in the Seebeck coefficient, however, showing an improvement only in electron-doped films under compressive stress. Overall, the addition of elevated temperature to the bending experiments resulted in a decrease in the mechanical stability of the films...