



ISTITUTO ITALIANO
DI TECNOLOGIA

TITLE

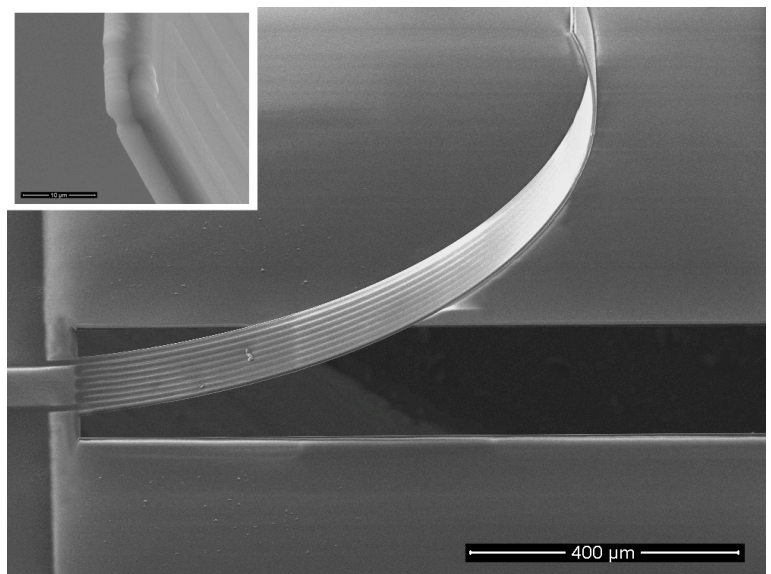
Electro-active micro electro-mechanical system and related detection procedure

INVENTORS

Antonio Quattieri, Francesco Rizzi, Massimo De Vittorio, Adriana Passaseo, Maria Teresa Todaro, Gianmichele Epifani

DESCRIPTION

Bioengineered Micro Electro-mechanical systems (MEMS) make it possible to fabricate sensors and actuators in microscopic dimensions mimicking already naturally developed sensing solutions, like natural Hair Cells, equipping commercial and high-tech electronics with devices for augmented reality. This invention describes a simple and original design and fabrication processing of a stress-driven out-of-plane bent Artificial Hair Cell exploiting the piezo-electricity and piezo-resistivity properties of material both as read-out and actuation. This device presents a four or six electrodes configuration able to sense a fluid flow or shear forces in direction parallel to the device substrate. The interplay of both piezo-resistance and piezo-electric allows tuning the best sensitivity and dynamic working range for any single experimental situation, during a flow or inertial force measurement.



APPLICATIONS

The original arrangement of stress-driven geometry and of the interplay of piezo-properties allows the artificial cilium to be functionalized and behave as a bio-mechanical sensor of pollutants and chemical species in still and flowing liquids. The out-of-plane geometry allows the flow and shear force sensor to be used in Autonomous Underwater Vehicles, mimicking the natural Lateral Line fishes developed as the most efficient sensing system in water. Moreover, the bio-mimicked adaptation mechanism (able to recover sensitivity and dynamic working range in case of signal saturation) could be exploited for designing Artificial Hair Cells as sound detector for innovative cochlear implantation systems for ear-impaired people.

KEYWORDS

bio-engineered MEMS, flow sensing, stress-driven cantilever, adaptation

BIBLIOGRAPHIC DATA TO2010A000748

Dispositivo microelettromeccanico elettro-attivo e relativo procedimento di rivelazione

Application Number	TO2010A000748
Priority Date	September 13, 2010
Applicants	Fondazione Istituto Italiano di Tecnologia

CONTACTS

Technology Transfer Office	Lorenzo Rossi	+39 010 71781 489
		lorenzo.rossi@iit.it

Fondazione Istituto Italiano di Tecnologia - Italian Institute of Technology

Sede Legale: Via Morego, 30 16163 Genova Uffici di Roma: Via Guidubaldo del Monte, 54 00197 Roma
Tel. 010 71781 Fax. 010 720321
C.F. 97329350587 - P.I. 09198791007