



PhD in FISICA / PHYSICS - 37th cycle

THEMATIC Research Field: INTEGRATION OF LED-FREE PIEZOELECTRIC MATERIALS IN MEMS

Monthly net income of PhDscholarship (max 36 months)

€ 1400.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

The research program will focus on the integration of lead-free piezoelectric materials on MEMS devices (sensors, actuators, energy harvesters, etc.). Given the regulatory standards of the European Commission on reducing the use of lead also in microelectronics, there is an urgent need to replace PZT, the piezo material widely used in MEMS, with innovative lead-free materials. However, there are currently no solutions compatible with industrial applications. The project aims to fill this gap by working in synergy with one of the major players in the MEMS field: STMicroelectronics.

Methods and techniques that will be developed and used to carry out the research

The candidate will work in a team made of a full professor, an assistant professor and a PhD student in the framework of the Joint Research Centers STEAM between Politecnico di Milano and STMicroelectronics. Experimental activities will be carried out in Polifab (www.polifab.polimi.it). In particular the candidate will work on a new, fully automatized cluster tool for confocal sputtering on 8" wafers, equipped with two chambers for functional oxides and metals. The following activities are foreseen: (i) identification of emerging lead-free materials compatible with silicon processes in cooperation with DFT theoreticians; (ii) syntheses of piezoelectric films by PVD processes on 8" wafers; (iii) film characterization, (iv) integration in MEMS prototypes.

Educational objectives

Development of interdisciplinary knowledge at the boundary between physics, microfabrication technology,



	micromechanics and electronics.
Job opportunities	This activity will be carried out within the Joint Research Center of STM and Politecnico di Milano (MEMS lab), in strong connection with the world of MEMS development and production. This PhD will represent a solid basis for careers both in academia and in MEMS industry.
Composition of the research group	1 Full Professors 2 Associated Professors 2 Assistant Professors 4 PhD Students
Name of the research directors	Riccardo Bertacco

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	564.01 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Educational activities per year : 1st year: 0 2nd year: 1534 euros per student 3rd year: 1534 euros per student. or 1022 euros per student for each year. Teaching assistantship: There are various forms of financial aid for activities of support to the teaching practice.



The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

Computer and Desk availability: individual use