

THIN-FILM BIOMEMS

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The possibility to apply microelectronics and nanotechnologies to biological applications has driven the development of a class of devices known as BioMEMS. In these devices, electronic, electromechanical and microfluidic elements can be combined to allow sensitive, automated and, potentially, portable biomedical devices. Our research at INESC MN centers on the application of thin film electromechanical and electronic devices to biological sensing applications.

In this talk, we present an overview of two aspects of this work:

- Electric-Field addressing of biomolecules:

In this work, a single, fast, electric field pulse is used to significantly enhance the kinetics of DNA immobilization and hybridization, as well as protein immobilization, on a functionalized thin-film surface. We will also discuss how this can be applied to fabrication and analysis of DNA microarrays.

- MEMS-based biomolecular detection:

We will describe the fabrication and properties of thin-film silicon and polymer microelectromechanical systems, and their application as molecular biosensors for on-chip detection of DNA and proteins.

João Pedro Conde



João Pedro Conde received his Ph.D in Electrical Engineering from Princeton University in 1989. His thesis topic involved the study of the optoelectronic properties of amorphous silicon-silicon germanium multilayers. Between 1989 and 1990 he was an IBM post-doctoral fellow at Yorktown Heights, where he developed a low temperature process for the deposition of amorphous silicon for which a patent was awarded. Since 1990 he has been at the Instituto Superior Tecnico where he is presently a professor in the Chemical and Biological Engineering Department. He is a co-responsible for the Large Area Electronics research group of INESC Microsystems and Nanotechnologies. His current research interests include novel thin film devices such as thin film MEMS and DNA arrays, low temperature deposition of amorphous and microcrystalline semiconductors and electronic devices on plastic and the development of new chemical vapor deposition techniques.