inct
institutos nacionais
de ciência e tecnologia

- Program of CNPq/MCT with partnership of FAP´s and CAPES
- 123 projects
- R$ 581 millions
- Period: 2009 a 2014

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- Scope of the networks
  - Mobilize, aggregate and articulate actions in specific fields
  - Foster advances at scientific frontiers
  - Stimulate technological development to promote innovation and entrepreneurship
  - Contribute to education and formation of qualified human resources
  - Contribute to the diffusion of S&T to general public

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INCT NAMITEC
Micro and Nanoelectronics Systems

- **CNPq Proc. no. 573738/2008-4**
- **FAPESP Proc. no. 2008/57862-6**
- **Period: March 2009 a Feb. 2014**
- **http://namitec.cti.gov.br**
- **namitec@cti.gov.br**

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INCT NAMITEC
Micro and Nanoelectronics Systems

- Members:
  - 136 researchers
  - 23 institutions
  - 13 states
- Financial support:
  - CNPq + FAPESP + CAPES
  - R$ 7.197.327,57 + 431.839,65 = 7.629.167,22

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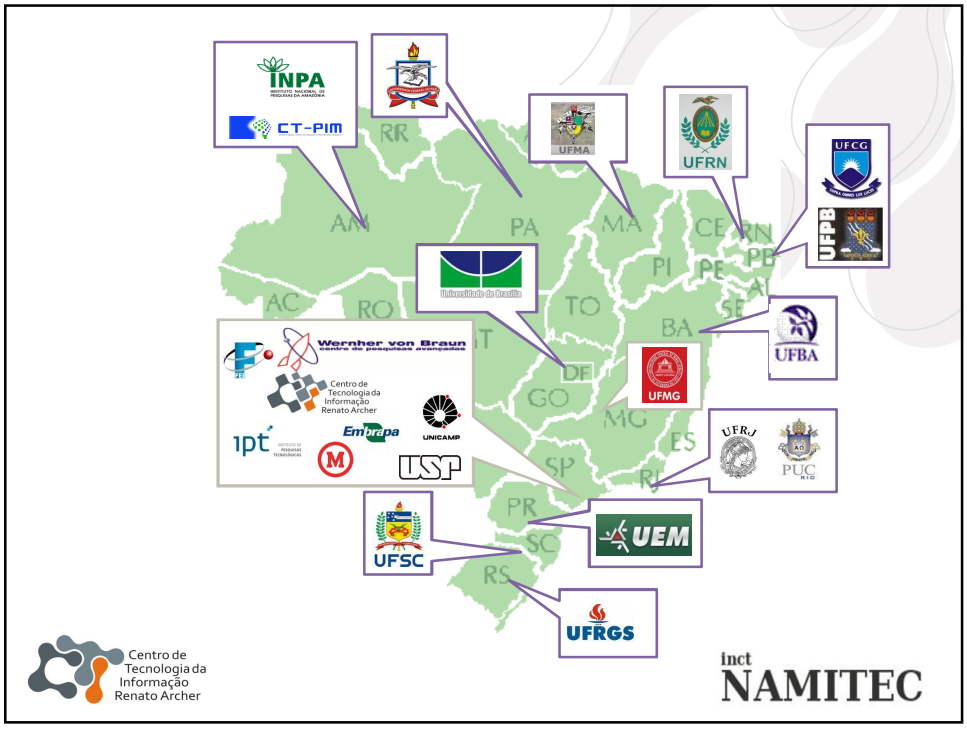

NAMITEC is an Interdisciplinary Network

- EE Dept's: 13
- Informatics/Computer Dept's: 3
- Physics Dept's: 3
- Chemistry Dept's: 1
- Agriculture: Embrapa
- Biologia/ecologia INPA
- General R&D Institutes: IPT, CCS, CTI, CT-PIM, VonBrawn

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Impact of the NAMITEC Project

- Generation of Scientific & Technological knowledge
- PhD, master, undergrad & specialization education
- Up grade of laboratories
- Collaboration between groups in Brazil
- Collaboration with international universities
- Interaction & technology transfer to industries
- Knowledge diffusion to society: web site, workshops, colloquia, expositions, press releases, etc.

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NAMITEC - Research Objectives

- R&D on System on Chip and Wireless Sensor Network Systems;
- R&D on IC design and test methodologies and tools for low power consumption, fault tolerance, including analog, RF and digital circuits;
- R&D on micro and nanoelectronics, photonics, optoelectronics, MEMS and NEMS devices and its integrations processes and packaging;
- R&D on materials and techniques for micro and nanofabrication, necessary for the fabrication of devices and IC´s.

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R&D Activities and Selected Results

1. SoC and Sensor network
2. IC design
3. EAD
4. Devices
5. Materials and techniques

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A1 – SoC and Sensor Networks

#	ACTIVITY	COORDINATOR
A1-1	WLSNW applied to monitoring of amphibians	Linnyer
A1-2	Monitoring of environment variables (climate changes)	Linnyer
A1-3	WLSNW for monitoring leakage current at lightning protection for high voltage network	Freire
A1-4	Precision irrigation	André Torre
A1-5	Monitoring of ambient parameters in chicken farms and in crop farms	Freire
A1-6	Monitoring and tracing of animals (ambience)	André Torre
A1-7	Instrumental sphere for wireless monitoring of temperature and humidity in grain storage silos	Fabiano Fruett
A1-8	WLSNW with SoC based on network of chips	Susin
A1-9	Solution development with SoC for WLSNW applications	Susin
A1-10	Experiments with WLSNW in high humidity and high vegetal density ambients	Roberto Tavares
A1-11	Instrumental sphere for monitoring of transport conditions of fruits.	Carlos Eduardo Pereira

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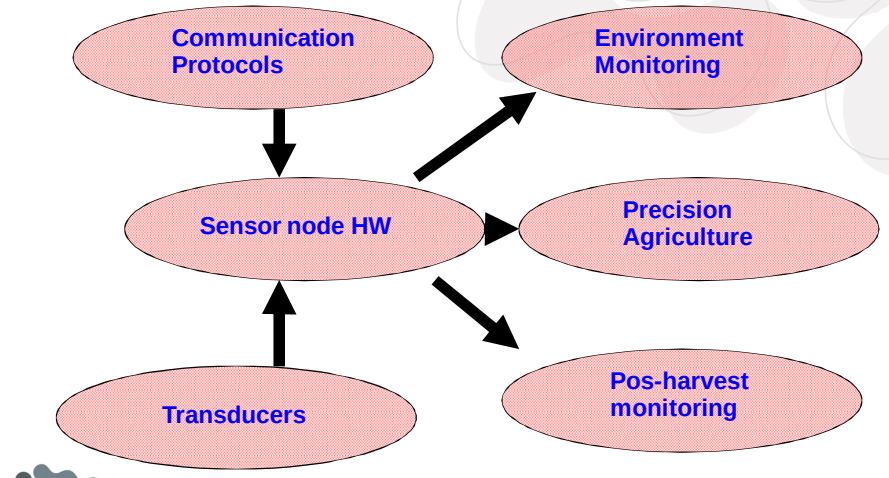
1. SoC and Sensor network

Main nucleus of interest and applications



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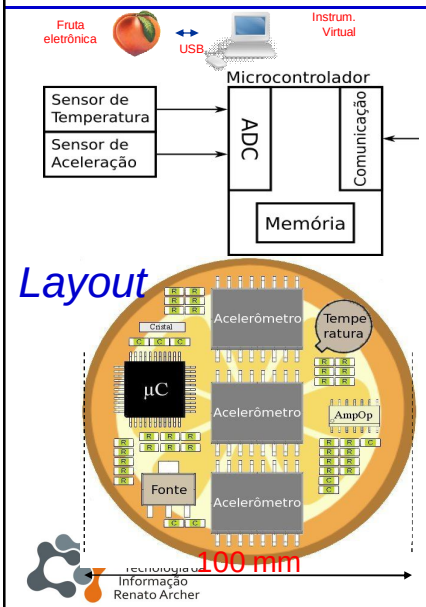
Monitoring and tracking agro products



Time, temperature and acceleration
First lab. prototype: Nov. 2007

Test Apparatus

Measurement Instrumentation

1D Accelerator Climatic Chamber

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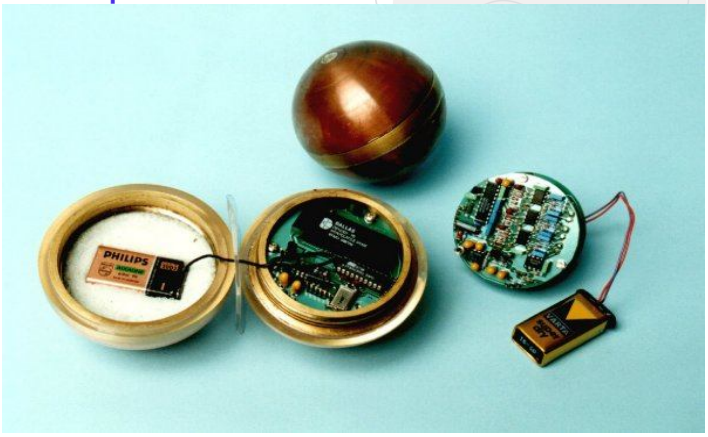
Pos-harvest monitoring

- Instrumental sphere for monitoring of transport conditions of fruits.



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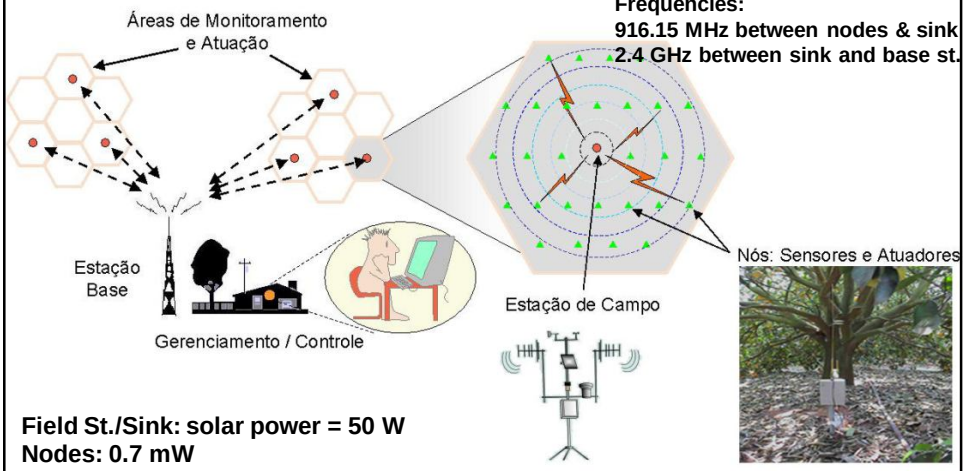
Irrigation Control System

Arquitetura do Sistema



Field St./Sink: solar power = 50 W
Nodes: 0.7 mW

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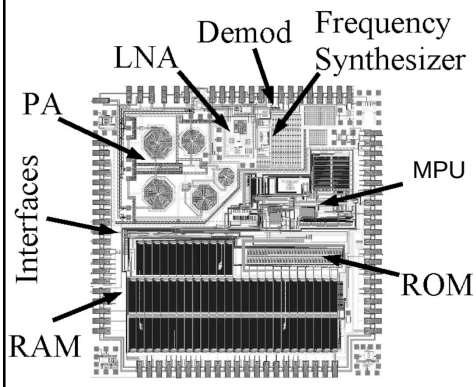
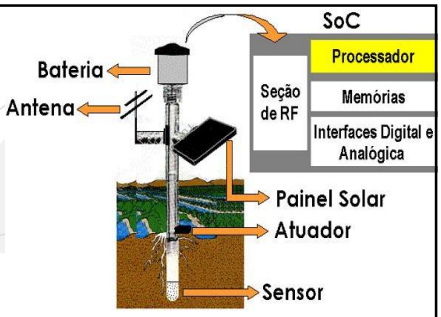
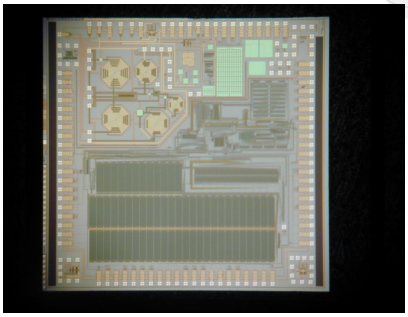
System on Chip







Integrated SoC Layout and Picture

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A2 – IC Design

#	ACTIVITY	COORDINATOR
A2-1	Interfaces to sensors	Catunda
A2-2	Electrical characterization	Gilson Wirth
A2-3	Design and characterization of RF circuits	Saulo Finco
A2-4	IP´s of RF IC´s	Rangel
A2-5	Design and characterization of analog IP libraries	Schneider
A2-6	A/D and D/A convertors	Freire
A2-7	Design and characterization of digital IP libraries	Guntzel
A2-8	Operational amplifiers	Ivan S. de S.S.
A2-9	CMOS analog filters using compansor architectures	Ana Cunha
A2-10	Power managing units	Saulo Finco
A2-11	Simulation and design of radiation and variability tolerant circuits	Fernanda Lima
A2-12	Multiband RF amplifiers	Robson Nunes
A2-13	IC design with nanoelectronic devices	Camargo

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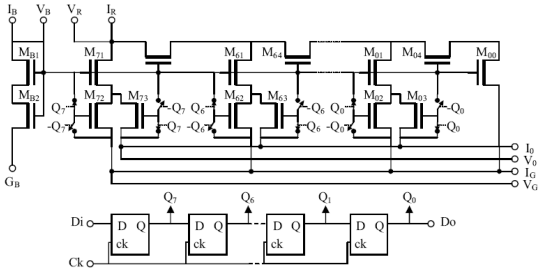
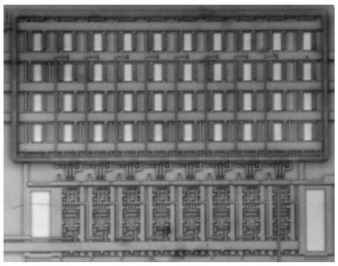
An *M-2M* Digital-to-Analog Converter Design Methodology Based on a Physical Mismatch Model

Hamilton Klimach
Federal University of Rio Grande do Sul
Porto Alegre, Brazil
hamilton.klimach@ufrgs.br

Marcio Schneider and Carlos Galup-Montoro
Federal University of Santa Catarina
Florianópolis, Brazil
{marcio, carlos}@eel.ufsc.br





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US 20080064433A1

United States
Patent Application Publication (10) **Pub. No.: US 2008/0064433 A1**
Huyart et al. (43) **Pub. Date: Mar. 13, 2008**

DIRECT FREQUENCY CONVERSION DEMODULATOR AND MODULATOR-DEMODULATOR

Inventors: **Bernard Huyart**, Lognes (FR); **Fernando Rangel De Sousa**, Montrouge (FR)

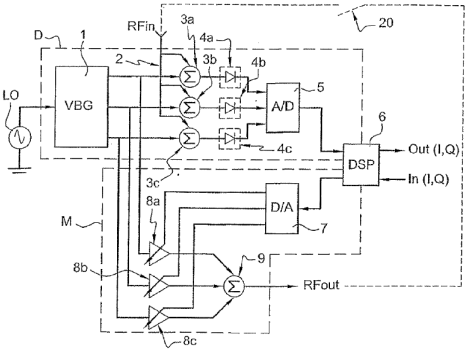
(30) **Foreign Application Priority Data**

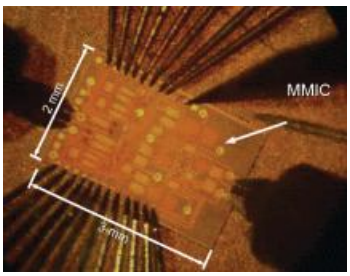
Oct. 8, 2004 (FR) 0410644

Publication Classification

(51) **Int. Cl.**
H04B 1/40 (2006.01)
H03D 3/00 (2006.01)
H04B 1/16 (2006.01)

(52) **U.S. Cl.** **455/550.1**; 329/306; 455/321





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An Wideband Multistage Signal Generator for Cognitive Radio Five-Port Receiver

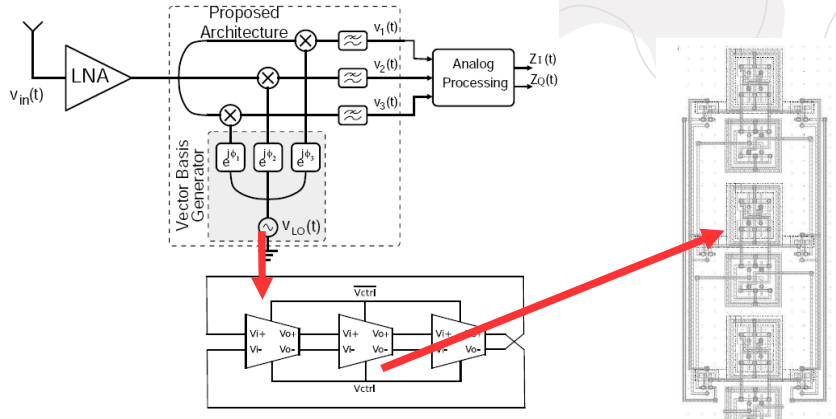

Figure 7: Three-stage differential ring VCO

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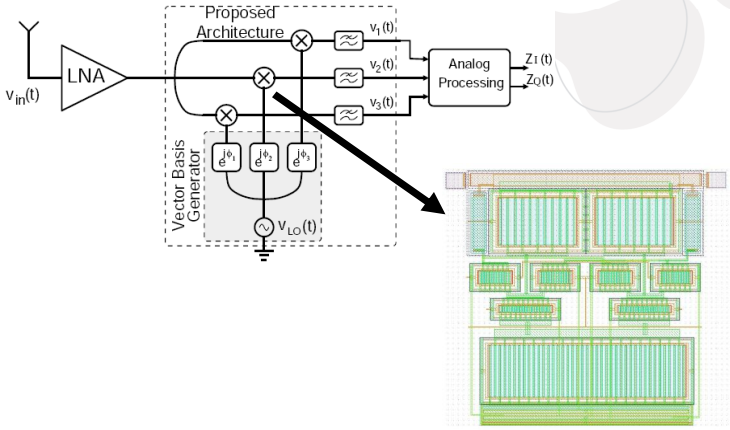
Highly improved IIP2 direct conversion receiver



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A3 - EAD

#	ACTIVITY	COORDINATOR
A3-1	Computer assisted design and layout of robust analog circuits to fabrication process parameter variation and with minimum silicon area	Petraglia
A3-2	Transactional modeling tool for systems on silicon	Jacobi
A3-3	“Library Free” IC logical synthesis	Reis
A3-4	Routing and positioning for IC´s	Johann
A3-5	Automatic layout synthesis of IC´s at transistor array level	Reis
A3-6	Development ambient for wireless sensor network applications based on SoC for network of chips	Susin
A3-7	Reliability and testability	Lubaszewsk

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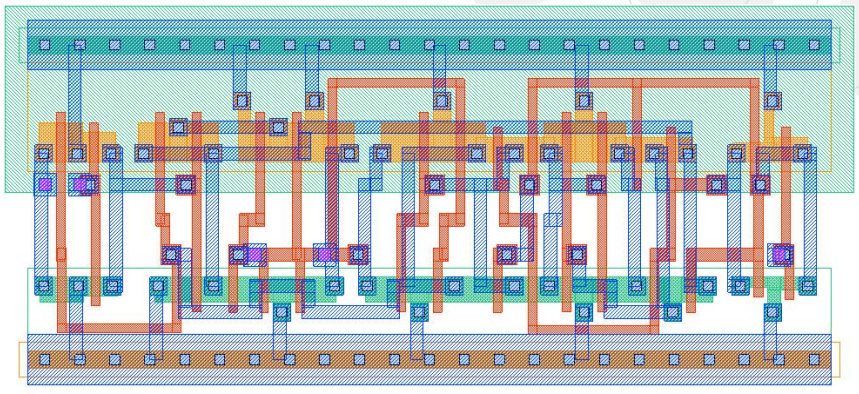
EAD Tools

ASTRAN

Automatic cell generation tool

JK1 (34 transistors)



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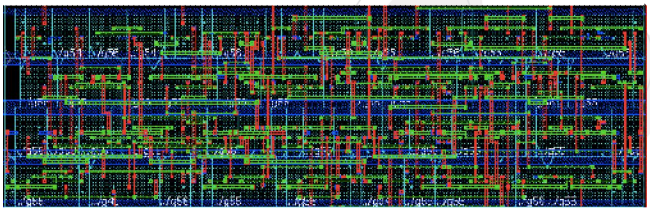
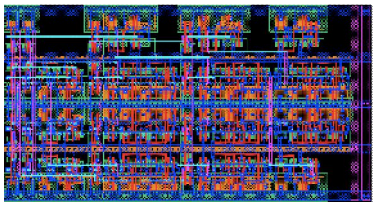
Automatic Layout Generation

Multiplier Carry-Save 4x4



Standard Cell (Vendor Flow)



Generated with our Data Path Compiler

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A4 - Devices

- Emphasis on microsensors on MEMS structures
- Nanometric FinFET transistors
- Photonic devices
- Organic solar cells

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#	ACTIVITY	COORDINATOR
A4-1-1	ISFET (Ion Sensistive Field Effect Transistor)	Diniz
A4-1-2	Polymeric Micro and nanofibers by electrostatic deposition	Ana Neilde
A4-1-3	Chemical sensors based on nanostructured carbon	Maia da Costa
A4-1-4	Chemical sensors on SiC to detect hydrogenated compounds	Fernanda
A4-1-5	Chemiresistors to detect hydrogen	Sebastião
A4-1-6	SOI FinFET transistor as hydrogen sensor	Martino
A4-1-7	Organic sensors based on polymers	Artemis
A4-1-8	Acetylene sensor using green ceramics	Sebastião
A4-2-1	Development of integrated optical sensors for environmental chemical analysis	Morimoto
A4-2-2	Photometry and imaging at the THz band spectrum	Pierre
A4-3-1	Nanofabricated thermo-electrical oscillator	Fabiano Fruett
A4-3-2	Development of a photo-acoustic spectrometer using a camera with pressure chip to characterize biofuels	Milton Bugs
A4-3-3	SAW sensors with carbon nanotubes	Sergey
A4-3-4	Development of a silicon-polymer conductor flexible cantilever as a water vapor sensor	Herrmann
A4-3-5	Development of microfluidic decives	Aristides
A4-3-6	Development of a ultra-sensitive spectrometer with an integrated capillary analytical column to a mass spectrometer detector based on SAW devices	Aristides
A4-4	Alternative photovoltaics	Victor
A4-5	Antennas on circuit board for wireless sensor networks	Glauco
A4-6	Packaging for devices	Biasoli

Area A5

#	ACTIVIDADE	COORDINATOR
A5-1	Nanostructured carbon materials (CNT, graphene)	Stanislav
A5-2	Synthesis and characterization of nanostructured semiconductor materials: Si, Ge, III-V e II-VI	Prioli
A5-3	Synthesis and characterization of thin film and bulk materials: high k dielectrics, SiC, Ge	Fernanda
A5-4-1	Deposition of proteins on metallic substrates for R&D of BioMEMS	Raquel Bugs
A5-4-2	Synthesis and characterization of organic materials for biochemical sensors	Casarini

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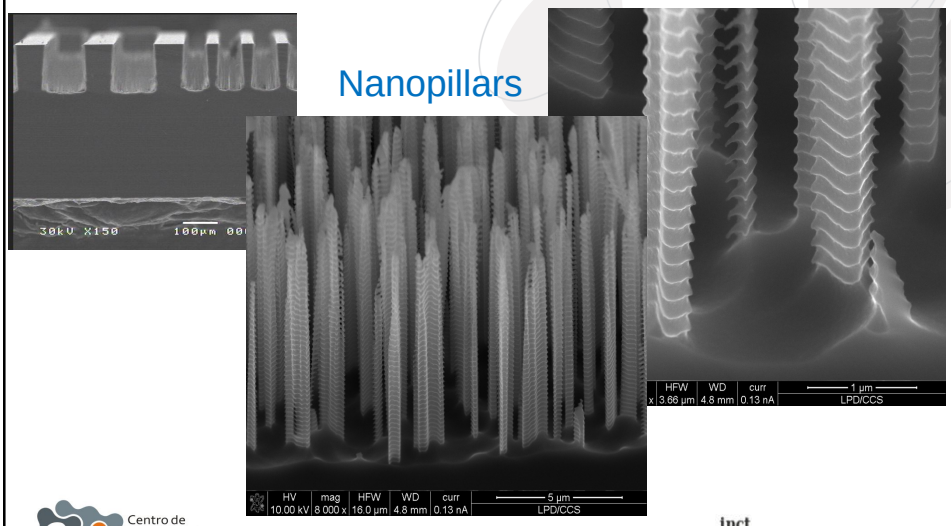
FORMATION OF SILICON NANOPILLARS AND NANOCONES USING DEEP REACTIVE ION ETCHING (DRIE)



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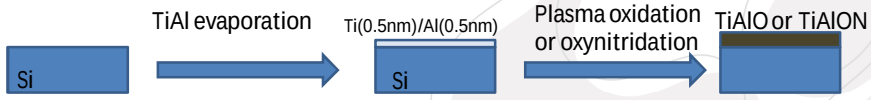
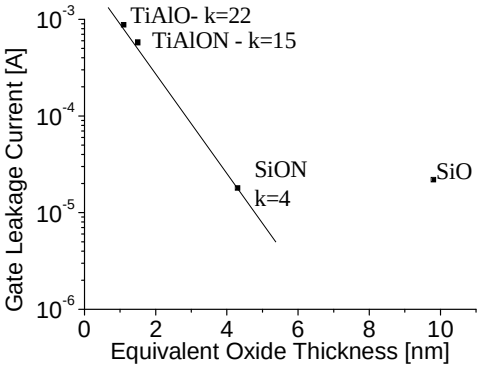
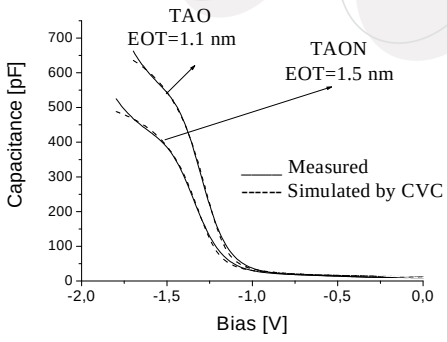
High-k (TiAlO or TiAlON)







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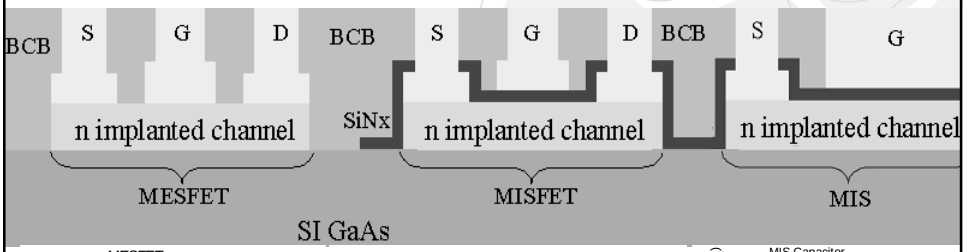
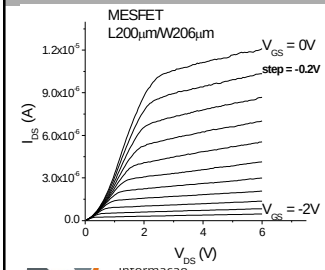
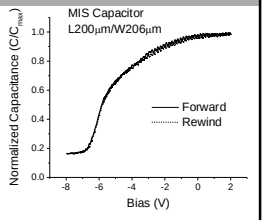
ECR-CVD SiN_X Passivation in GaAs-based MISFET Devices

MISFET, MESFET and MIS capacitor fabrication at the same SI GaAs substrate







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Acknowledgments and contacts

- Thanks for you interest
- Thanks to all NAMITEC members
- Thanks to CNPq, FAPESP and CAPES for financial support
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