

CENTRE FOR RESEARCH IN CERAMICS & COMPOSITE MATERIALS



João Rocha

Director



Mission

- To develop the scientific and technological knowledge base required for the innovative production and transformation of ceramic and composite materials

Vision

- To become a leading inter-disciplinary European research laboratory in the field of materials
- To contribute to the development of a scientific culture at a national level and to stimulate innovation within the industrial sector

International
Advisory Board

University
of Aveiro

CICECO

Centre for Research in Ceramics
& Composite Materials

Scientific Council (140 PhDs)

Directors (J Rocha, J Vieira, L D Carlos)

Directing Board (Directors + 12 membros)

CEBAL

Centre of Agricultural and
Agrofood Biotechnology
of Alentejo
(A Silvestre)

CEIM

Centre for Imaging
and Structural
Studies

CDTM

Centre for
Materials Design
and Technology

CECET

Centre for Science,
Education and
Technology Studies
(J Pedrosa)

Research Line 1

Nano- & micro-structured materials
for information & communication
technology

2 Groups

Research Line 2

Materials for energy and
industrial applications

2 Groups

Research Line 3

Sustainability
& Biomaterials

2 Groups

PEOPLE (2010)

Profs./Lecturers (PhDs)	50	(8%)*
Researchers	35	(42%)
Post-Docs	54	(49%)
PhD Students	82	(26%)
MSc and Other Students	115	
Lab Technicians	3	
Administrative staff	6	
TOTAL	448	



Chemistry Department 1



Chemistry Department 2



Ceramics and Glass Engineering
Department



Physics Department

Research Areas

Line 1 - Advanced Micro & Nano-Structured Materials for Communications Technologies

- Inorganic Functional Nanomaterials & Organic-Inorganic Hybrids
- Multifunctional Ferroic Ceramics and Nanostructures



Line 2 - Materials for Energy & Industrial applications

- Materials for Energy Conversion and Storage
- Carbon Materials, Composites and Functional Coatings



Line 3 - Sustainability & Biomaterials

- Biorefineries, Biobased Materials and Recycling

- Biomedical and Biomimetic Materials



Characterisation Methods (expertise)

	Oxides	Organic Materials	Hybrids	Bio-Materials	Softmatter (polymers, colloids, nanocomposites)	Other Inorganic Materials
Synchrotron radiation (diffraction, EXAFS XANES, SAXS)	G1		G1			
Microscopy (optical, SEM, TEM, scanning probe)	G1 G2		G1 G2		G1 G2	G4
Electrical properties characterisation (impedance spectroscopy, ferroelectric, electromechanical)	G2 G3					
Photoluminescence	G1		G1		G1	
Solid & liquid state NMR	G1	G1	G1	G6	G1	G1
Other Spectroscopies (IR,UV,Raman, perturbed angle correlation spectrosc.)	G1 G3 G4	G1	G1		G1	G1
Diffractometry (single-crystal and powder lab XRD)	G1 G2 G3		G1			G1 G3
Magnetic Properties (VSM)	G2		G2			G2
Mechanical Properties				G6	G1	G4
Mass spectrometry				G6	G5	
Thermal analyses	G3				G5	G5

Equipment

Centre for Imaging & Structural Studies



5.4 M€ awarded to CICECO in recent QREN programme

- Electron Microscopes: HR-(EF)TEM 200 kV JEOL 2200FS; HR-FESEM Hitachi SU-70
- AFM
- Single-crystal and powder XRD diffractometers (variable T/atmosphere)
- NMR: Bruker Avance II, 400 MHz w.b., 300 MHz n.b., 500 MHz n.b. with LC NMR
- Photoluminescence spectrometers
- VSM (magnetism)
- FTIR, FT Raman, UV-Vis (reflectance)
- Thermal analysers (DSC, DTA, TG)
- Extensive mass spectrometry, GC and LC equipment
- Full dielectric, piezoelectric and ferroelectric characterisation



OUTPUT - I

2010

PhD Theses

21

MSc Theses

89

Papers SCI

367

IF \geq 5

33

IF [2-5[

208

(2009)

Patents (National)

5

(10)

Patents (International)

1

(12)

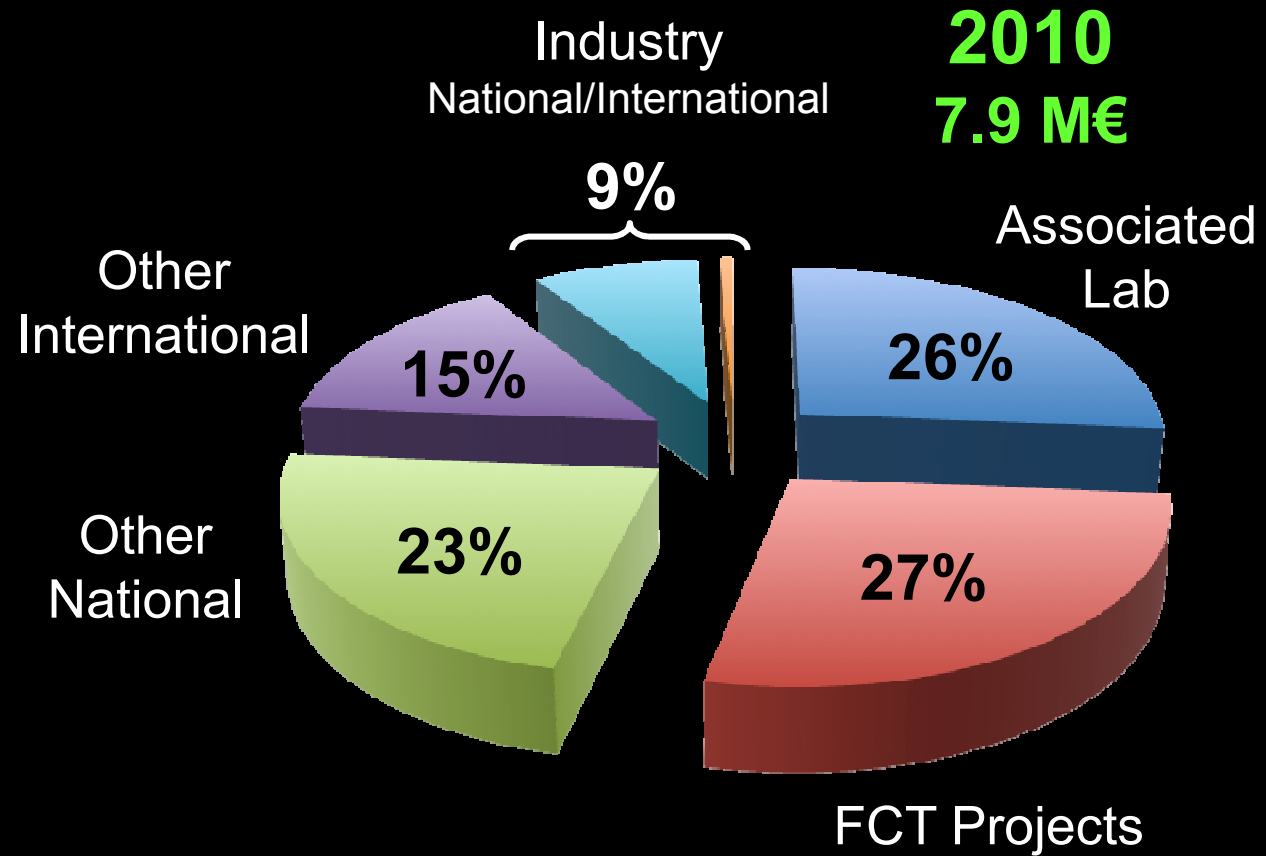
OUTPUT - II

Source: *Essential Science Indicators, Web of Knowledge*

- CICECO SCI papers in 2009 – 3% National Total
- World Ranking for Materials Science 2000-2010 :
University of Aveiro 79 (18/15 in Europe) (11758 citations, 39% of Portugal)

- 1) Univ Cambridge (31107)
- 2) Max Planck Society
- 3) CSIC (30824 – UA38%)
- 4) CNRS (27877 -UA42%)
- 5) Univ London Imperial College
- 6) École Polytech Fed Lausanne
- 7) Univ Manchester
- 8) Univ Pierre & Marie Curie (17375)
- 9) ETH Zurich
- 10) Tech Univ Denmark (14253)
- 11) University Groningen
- 12) Delft Univ Technol
- 13) Univ Oxford (12086)
- 14) Karlsruhe Inst Technol
- 15) Eindhoven Univ Technol
- 16) Univ Sheffield
- 17) Eindhoven Univ Technol
- 18) Univ Aveiro (11758)
- 83) CALTECH (11344)

BUDGET



Industry

2010 - 726 k€
(330 k€ AdI)

Technology Transfer

Centre for Materials
Design & Technology

- Management of R&D consortia/services/projects with companies
- Identification of products and processes of commercial interest
- IP protection
- Creation of spin-off companies
- Licensing of technologies
- Identification of funding programmes (e.g. EU) and submission of proposals
- Marketing CICECO's image
- Organisation of training courses and technical workshops



Bruker BioSpin GmbH
CORUS Technology BV (The Netherlands)
GKSS - Forschungszentrum Geesthacht GmbH
Libyan Petroleum Institute
Merck KGaA
Procter & Gamble

ADP Fertilizantes SA
ALFAMA – Investigação e Desenvolvimento de Produtos Farmacêuticos Lda.
ANEPE - Ass. Nac. De Empresas de Produtos Explosivos
BIIPP
Bosch Termotecnologia SA
Caima, Indústria de Celulose SA
CIN - Corporação Industrial do Norte S.A.
Citrodora Lda
CUF – Químicos Industriais, S.A.
COLEPCCL Portugal – Embalagens e Enchimentos, S.A.
DURIT - Metalurgia Portuguesa do Tungsténio, Lda.
ECOPOLYOL
EURORESINAS/Sonae - Indústria de Revestimentos SA
Flexipol - Espumas Sintéticas, S.A.

Grupo Portucel Soporcel
Hovione
Innovnano - Materiais Avançados, SA
INOVALIGANTES
Metoxid, Óxidos Metálicos, S.A.
MODESP - Modelação Especializada, Lda
Modicer, Moda Cerâmica, SA
NATAL
Nova AP – Fábrica de Nitrato de Amónio de Portugal, SA
R.M.C. – Revestimentos de Mármore Compactos, S.A.
PARTEX SERVICES PORTUGAL - Serviços para a Indústria
Petrolífera, S.A.
SAPEC
RAIZ - Instituto de Investigação da Floresta e Papel
REDVIA
Resiquímica S.A
Revigrés - Indústria de Revestimentos de Grés, Lda.
RiaBlades
S.A SIMOLDES AÇOS LDA
Sociedade de Areias de Construção e Turismo, Lda
UNICER SPGS SA
YDreams

Start-ups

- **FOODMETRIC SA** – solutions for food industry based on fast Instrumental analysis methods and chemometrics



- **TETRACARBON** - solutions based on advanced ceramics and materials coated with diamonds

- **CERQUT** – High performance variable RF (business plan)

- **NANOSMARTEK** – Nanotechnology solutions applied to the protection against corrosion (business plan)

Technology Platforms

- CICECO-companies clubs (fee 7.5 k€/year)
IDPOR: Polymers from renewable sources

- In preparation: Competitiveness Pole in Ceramics (with Limoges)
Energy platform

NETWORKS

- NoE FAME: Functionalised Advanced Materials and Engineering of Hybrids and Ceramics (now EMMI)
- Various EC projects, IPs,..., COST actions, ESF
- Erasmus Mundus MSc:

EMMS Joint European Programme in Materials Science (Aalborg, Hamburg Univs.)

FAME

- RENAMI-INAMI Brazilian Network
- National Microscopy and NMR Networks

CICECO Social - I

Programms wity local authorities

Urban Network for Innovation in Ceramics (financiado por URBAC)
(municípios de Aveiro, Limoges, Pécs, Delft e Selb)

Programms with hospitals

HUC, Maternidade Bissaya Barreto (Coimbra)
Hospitais de Matosinhos, de Gaia e de Sta. Maria da Feira
Hospital de Sta. Maria de Lisboa

CICECO Social II - Commitment to Outreach Activities

- Within U Aveiro: Science & Technology week, summer academy, ...
- Cooperation with Secondary Schools, including organising the national Chemistry Olympiads
- Cooperation with Aveiro Science Centre And the National programme 'Ciência Viva'



Madrid

- TV and radio programmes, newspapers
- Project 'Chemistry of Everyday Things' (366 k€)

CICECO Social - III

Integration of CEBAL (Beja) in CICECO

Centre of Agricultural and Agrofood Biothechnology of Alentejo

Scientific Director – A Silvestre (CICECO)

- Agrofood Biotechnology
- Agroforestry Biotechnology
- Environment/Adding value to wastes

