

CURRICULUM VITÆ

CARLOS ALBERTO NUNES DE CARVALHO

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1. DADOS PESSOAIS

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2. ENSINO SUPERIOR

Pós-Licenciatura: • Provas de Aptidão Pedagógica e Científica na Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa com a classificação de Muito Bom (1989).
• Doutoramento em Ciências dos Materiais, especialidade Materiais Semicondutores, na Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa com "Distinção e Louvor" por unanimidade (1996).

3. ACTIVIDADE UNIVERSITÁRIA

- Assistente Convidado do Departamento de Ciência dos Materiais da Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa (Julho 1980).
- Assistente do Departamento de Ciência dos Materiais da Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa (1989).
- Professor Auxiliar do Departamento de Ciência dos Materiais da Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa (1996).
- Professor Auxiliar de Nomeação Definitiva do Departamento de Ciência dos Materiais da Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa (2001).

4. CURSOS

- "Vacuum Training", Edwards, Crawley, Sussex, Inglaterra (1988).
- "Winter European Course on Amorphous Silicon: Fundamental Properties and Applications", Folgaria, Itália (1988).
- "Winter European Course on Amorphous Silicon: The Material and its Optoelectronic Applications", Folgaria, Itália (1989).

5. ESTÁGIOS

- "Técnicas de produção de dispositivos de silício cristalino", Universidade de São Paulo, Brasil (1989).
- "Alinhador de máscaras", Karl Suss KG, Munique, Alemanha (1991).
- "Espectroscopia de Auger", University of Technology Eindhoven (TUE), Holanda (1993).

6. ACTIVIDADE CIENTÍFICA

A actividade científica desenvolveu-se no Centro de Física Molecular do Complexo Interdisciplinar da Universidade Técnica de Lisboa desde 1980 até 2006. Integra o ICEMS a partir de 2008.

6.1 Áreas de Investigação:

- Películas finas de óxidos dopados transparentes e condutores (óxido de índio dopado com estanho - ITO).
- Películas finas de silício amorfo dopado (tipo-n; tipo-p) e não dopado.
- Dispositivos de silício amorfo.
- Tecnologia de aplicação de cristal líquido.
- Películas finas de óxidos não dopados transparentes condutores, semicondutores e isolantes depositadas à temperatura ambiente pela técnica de rf-PERTE.
- Películas finas de óxido de cobre pela técnica de rf-PERTE.

6.2 Projectos Científicos Recentes

6.2.1 Em curso

I) POCTI/CTM/41317/2001: "Cycle CVD of thin films of Si and C alloys" SICAL (investigador responsável: Reinhard Horst Schwarz - IST). Início em 2002.

II) PTDC/EEA-ELC/74334/2006: "Thin films transparent CMOS" (investigador responsável. Ana Amaral – IST). Início em 2007.

III) "Low cost silicon (LOCOSIL)" (investigador responsável. Ana Amaral – IST). Início em 2010.

6.4 Publicações Científicas

6.4.1 Livros

- 1.1) C. A. Nunes de Carvalho, "Películas finas de óxido de índio e estanho (deposição, caracterização e estudo do comportamento em dispositivos)"
Tese de Doutoramento, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, 1995 (discussão pública em 1996).
- 1.2) C. A. Nunes de Carvalho, "Electrónica do Estado Sólido"
ed. Casa das Folhas, FCT-UNL (1999); (2003).

6.4.2 Listagem das publicações em revistas do "Science Citation Index" do ISI.

- 1) R. Martins, N. Carvalho, E. Fortunato, A. Maçarico, M. Santos, I. Baía, M. Vieira and L. Guimarães, "Effects of U. V. light on the transport properties of a-Si:H films during their growth"
Journal of Non-Crystalline Solids 97 & 98, Part 2, (1987), p. 1399.

- 2) L. Guimarães, R. Martins, M. Santos, A. Maçarico, N. Carvalho, E. Fortunato and M. Vieira, "Hydrogenated amorphous silicon semiconductors produced by two consecutive decomposition and deposition chamber system"
Vacuum 39, Issues 7-8, (1989), p. 789.
- 3) J. M. M. de Nijs, C. Carvalho, M. Santos and R. Martins, "A thin SiO layer as a remedy for Indium reduction at the In₂O₃/μc-Si:C:H interface"
Applied Surface Science 52 (4) (1991), p. 339.
- 4) R. Martins, I. Ferreira, N. Carvalho and L. Guimarães, "Engineering of plasma deposition systems used for producing large area a-Si:H devices"
Journal of Non-Crystalline Solids 137-138, Part 2, (1991), p. 757.
- 5) C. Longeaud, J. P. Kleider, D. Mencaraglia, A. Amaral and C. N. Carvalho, "Determination of the density of states of p-doped hydrogenated amorphous silicon by means of the modulated photocurrent experiment"
Journal of Non-Crystalline Solids 164 & 166 (1993), p. 423.
- 6) M. Vieira, E. Fortunato, C. N. Carvalho, G. Lavareda and R. Martins, "Influence of the photodegradation on the μτ and microstructure of the pin a-Si:H devices"
Vacuum 45, No 10/11, (1994), p. 1109.
- 7) M. Vieira, E. Fortunato, G. Lavareda, C. N. Carvalho and R. Martins, "Light and temperature effect on pin a-Si:H device performance"
Vacuum 45, No 10/11, (1994), p. 1147.
- 8) C. Nunes de Carvalho, A. M. Botelho do Rego, A. Amaral, P. Brogueira and G. Lavareda, "Effect of the substrate temperature on the surface structure, composition and morphology of ITO thin films"
Surface & Coatings Technology 124 (2000), p. 70. 2nd MOST CITED (34)
- 9) A. Amaral, P. Brogueira, C. Nunes de Carvalho and G. Lavareda, "Early stage growth structure of indium tin oxide thin films deposited by reactive thermal evaporation"
Surface & Coatings Technology 125 (2000), p. 151.
- 10) C. Nunes de Carvalho, A. Luís, G. Lavareda, A. Amaral, P. Brogueira and M. H. Godinho, "ITO thin films deposited by RTE on flexible transparent substrates"
Optical Materials 17, No 1-2 (2001), p. 287.
- 11) A. Amaral, P. Brogueira, C. Nunes de Carvalho and G. Lavareda, "Influence of the initial layers on the optical and electrical properties of ITO films"
Optical Materials 17, No 1-2 (2001), p. 291.
- 12) P. M. Gordo, V. S. Subrahmanyam, M. Duarte Naia, C. Lopes Gil, A. P. Lima, G. Lavareda, C. Nunes de Carvalho and A. Amaral, "Role of the rf power on the structure of defects in a-Si:H films produced by PECVD"
Materials Science Forum 363-3 (2001), p.454.
- 13) A. Luís, C. Nunes de Carvalho, G. Lavareda, A. Amaral and P. Brogueira, "ITO coated flexible transparent cellulosic substrates for liquid crystal based devices"
Vacuum 64 (2002), p. 475.
- 14) G. Lavareda, C. Nunes de Carvalho, A. Amaral, J. P. Conde, M. Vieira and V. Chu, "Properties of high growth rate amorphous silicon deposited by MC-RF-PECVD"
Vacuum 64 (2001), p. 245.

- 15) M. Fernandes, A. Fantoni, Yu. Vygranenko, R. Schwarz, M. Vieira, C. Nunes de Carvalho, "Photocurrent Multiplication in ITO/SiO_x/Si optical sensors" *Vacuum* 65 (2002), p. 67.
- 16) C. Nunes de Carvalho, A. Luís, G. Lavareda, E. Fortunato and A. Amaral, "Effect of thickness on the properties of ITO thin films deposited by rf-PERTE on unheated flexible transparent substrates" *Surface & Coatings Technology* 151-152 (2002), p. 252.
- 17) A. Amaral, G. Lavareda, C. Nunes de Carvalho, P. Brogueira, P. M.Gordo, V. S. Subrahmanyam, C. Lopes Gil, M. Duarte Naia and A. P. de Lima, "Influence of the a-Si:H structural defects studied by positron annihilation on the solar cells characteristics" *Thin Solid Films* 403-404 (2002), p. 539.
- 18) C. Nunes de Carvalho, A. Luís, O. Conde, E. Fortunato, G. Lavareda and A. Amaral, "Effect of rf power on the properties of ITO thin films deposited by plasma enhanced reactive thermal evaporation on unheated polymer substrates" *Journal of Non-Crystalline Solids* 299, Issue 2 (2002), p. 1208.
- 19) C. Nunes de Carvalho, A. Luís, G. Lavareda and A. Amaral, "Influence of different unheated substrates on the properties of ITO thin films deposited by rf-PERTE" *Key Engineering Materials* 230-232 (2002), p. 567.
- 20) P. Almeida, G. Lavareda, C. Nunes de Carvalho, A. Amaral, M. H. Godinho, T. Cidade and J. L. Figueirinhas, "Flexible cellulose derivative PDLC type cells" *Liquid Crystals* 29, No. 3 (2002), p. 475.
- 21) C. Nunes de Carvalho, G. Lavareda, E. Fortunato and A. Amaral, "Properties of ITO films deposited by rf-PERTE on unheated polymer substrates-dependence on oxygen partial pressure" *Thin Solid Films* 427 (1-2) (2003), p. 215. 3rd MOST CITEDED (24)
- 22) G. Lavareda, C. Nunes de Carvalho, A. Amaral, E. Fortunato, A. R. Ramos and M. F. da Silva, "Dependence of TFT performance on the dielectric characteristics" *Thin Solid Films* 427 (1-2) (2003), p. 71.
- 23) P. Pereira, G. Lavareda, A. M. Botelho do Rego, A. Amaral and C. Nunes de Carvalho, "Optimization of a home-made RIE system – effect of SF₆ plasma on the properties of partially etched a-Si:H films" *Materials Science Forum* 455-456 (2004), p. 124.
- 24) G. Lavareda, C. Nunes de Carvalho, A. Amaral and E. Fortunato, "Improvement of field-effect mobilities in TFT's: surface plasma treatments vs stack dielectrics structures" *Materials Science Forum* 455-456 (2004), p. 64
- 25) C. Nunes de Carvalho, G. Lavareda, E. Fortunato, P. Vilarinho and A. Amaral, "ITO films deposited by rf-PERTE on unheated polymer substrates – properties dependence on In-Sn alloy composition" *Materials Science & Engineering B* 109, Issues 1-3 (2004), p. 245.
- 26) G. Lavareda, C. Nunes de Carvalho, A. Amaral, E. Fortunato, and P. Vilarinho, "A-Si TFT enhancement by plasma processing of the insulating/semiconductor interface" *Materials Science & Engineering B* 109, Issues 1-3 (2004), p. 264.
- 27) P. M. Gordo, M. Duarte Naia, C. Lopes Gil, A. P. Lima, G. Lavareda, C. Nunes de Carvalho, A. Amaral and Z. Kajcsos, "Positron annihilation studies in amorphous silicon nitride" *Materials Science Forum* 445-446 (2004), p. 90.

- 28) C. Nunes de Carvalho, G. Lavareda, E. Fortunato and A. Amaral, "Properties of ITO films deposited by rf-PERTE on unheated polymer sheets – dependence on rf electrode distance from substrates"
Journal of Non-Crystalline Solids 338-340 (2004), p. 630.
- 29) G. Lavareda, C. Nunes de Carvalho, E. Fortunato, A. Amaral and A. R. Ramos, "Properties of a-Si TFTs using silicon carbonitride as dielectric"
Journal of Non-Crystalline Solids 338-340 (2004), p. 797.
- 30) E. Fortunato, A. Pimentel, L. Pereira, A. Gonçalves, G. Lavareda, H. Águas, I. Ferreira, C. N. de Carvalho and R. Martins, "High field-effect mobility zinc oxide thin film transistors produced at room temperature"
Journal of Non-Crystalline Solids 338-340 (2004), p. 806. 1st MOST CITED (53)
- 31) R. Schwarz, M. Fernandes, J. Martins, A. Fantoni, M. Vieira, P. Sanguino, C. Nunes de Carvalho and T. Muschik, "Sensor element for a metal-insulator-semiconductor camera system (MISCam)"
Sensors and Actuators A: Physical 115, 2-3 SPEC. ISS. (2004), p. 331.
- 32) C. Nunes de Carvalho, G. Lavareda, E. Fortunato, H. Alves, J. Varela, R. Nascimento and A. Amaral, "ITO thin films with enhanced electrical properties deposited on unheated ZnO coated polymer substrates"
Materials Science & Engineering B 118, Issues 1-3 (2005), p. 66.
- 33) A. Amaral, C. Nunes de Carvalho, P. Brogueira, G. Lavareda, L. V. Melo and M. H. Godinho, "ITO properties on anisotropic flexible transparent cellulosic substrates under different stress conditions"
Materials Science & Engineering B 118, Issues 1-3 (2005), p. 183.
- 34) A. Fantoni, P. Louro, M. Fernandes, M. Vieira, G. Lavareda and C. Nunes de Carvalho, "Enhanced short wavelength response in laser-scanned-photodiode image sensor using an a-SiC:H/a-Si:H tandem structure"
Sensors and Actuators A: Physical 123-124 (2005), p. 343.
- 35) M. Vieira, M. Fernandes, P. Louro, A. Fantoni, G. Lavareda, C. Nunes de Carvalho and Yu. Vygranenko, "A two terminal optical signal and image processing p-i-n/p-i-n image and colour sensor"
Sensors and Actuators A: Physical 123-124 (2005), p. 331.
- 36) P. Louro, M. Vieira, A. Fantoni, M. Fernandes, C. Nunes de Carvalho and G. Lavareda, "Image and color recognition using amorphous silicon p-i-n photodiodes"
Sensors and Actuators A: Physical 123-124 (2005), p. 326.
- 37) M. Vieira, A. Fantoni, P. Louro, M. Fernandes, G. Lavareda and C. Nunes de Carvalho, "Light filtering in a-SiC:H multilayers stacked devices using the LSP technique"
Journal of Non-Crystalline Solids 352, 9-20 SPEC. ISS. (2006), p.1805.
- 38) M. Fernandes, A. Fantoni, P. Louro, G. Lavareda, C. Nunes de Carvalho, R. Schwarz and M. Vieira "Fine tuning of the spectral collection efficiency in multilayer junctions"
Thin Solid Films 511-512 (2006), p. 84.
- 39) P. Louro, M. Fernandes, A. Fantoni, G. Lavareda, C. Nunes de Carvalho, R. Schwarz and M. Vieira, "An amorphous SiC/Si image photodetector with voltage-selectable spectral response"
Thin Solid Films 511-512 (2006), p. 167.
- 40) C. Nunes de Carvalho, G. Lavareda, A. Amaral, O. Conde and A. R. Ramos, "InO_x semiconductor thin films for transparent electronics applications"
Journal of Non-Crystalline Solids 352, Issues 23-25 (2006), p. 2315.

- 41) G. Lavareda, C. Nunes de Carvalho, E. Fortunato, A. R. Ramos, E. Alves, O. Conde and A. Amaral, "Transparent thin film transistors based on indium oxide semiconductor" *Journal of Non-Crystalline Solids* 352, Issues 23-25 (2006), p. 2311. 4TH MOST CITED.
- 42) M. Vieira, M. Fernandes, P. Louro, A. Fantoni, G. Lavareda, C. Nunes de Carvalho and Yu. Vygranenko, "A real-time colour and image processing p-i-n/p-i-n device with optical readout" *Revista Mexicana de Física* 52, (2) (2006), p. 79-82.
- 43) M. Vieira, A. Fantoni, P. Louro, M. Fernandes, J. Martins, R. Schwarz, G. Lavareda and C. Nunes de Carvalho, "Colour filtering in a-SiC:H based p-i-n-p-i-n cells: a trade off between bias polarity and absorption regions" *Sensors & Actuators A: Physical* 132, Issue 1 (2006), p. 218.
- 44) P. Louro, M. Fernandes, A. Fantoni, G. Lavareda, C. Nunes de Carvalho and M. Vieira, "Bias sensitive spectral sensitivity in double a-SiC:H pin structures" *Superlattices and Microstructures* 40, Issues 4-6 (2006), p. 619.
- 45) P. M. Gordo, M. F. Ferreira Marques, C. Lopes Gil, A. P. Lima, G. Lavareda, C. Nunes de Carvalho, A. Amaral and Zs. Kajcsos, "Positron annihilation and constant photocurrent method measurements on a-Si:H films: A comparative approach to defect identification" *Radiation Physics and Chemistry* 76, Issue 2 (2007), p. 220.
- 46) M. Vieira, A. Fantoni, M. Fernandes, P. Louro, G. Lavareda and C. Nunes de Carvalho, "Bias sensitive multispectral structures for imaging applications" *Thin Solid Films* 515, Issue 19 (2007), p. 7566.
- 47) C. Nunes de Carvalho, G. Lavareda, P. Parreira, J. Valente, A. Amaral and A. M. Botelho do Rego, "Influence of oxygen partial pressure on the properties of undoped InO_x films deposited at room temperature by rf-PERTE" *Journal of Non-Crystalline Solids* 354, Issues 15-16 (2008), p. 1643.
- 48) J. C. Madaleno, L. Pereira, G. Lavareda, G. Cabral, C. N. Carvalho, A. Amaral, E. Titus, M. C. Coelho and J. Gracio, "A MIS transistor using the nucleation surface of polycrystalline diamond" *Diamond and Related Materials* 17, Issues 4-5 (2008), p. 768.
- 49) J. Valente, G. Lavareda, O. Conde, P. Parreira, A. Amaral and C. Nunes de Carvalho, "Role of rf power on the properties of undoped SnO_x films deposited by rf-PERTE at low substrate temperature" *Surface and Coatings Technology* 202, Issue 16 (2008), p. 3893.
- 50) P. Parreira, J. Valente, G. Lavareda, C. Nunes de Carvalho, A. R. Ramos, E. Alves, P. Brogueira and A. Amaral, "Role of oxygen pressure on the properties of undoped tin oxide films deposited at low substrate temperature" *Physica Status Solidi A* 205, No 8 (2008), p. 1957.
- 51) M. Vieira, A. Fantoni, P. Louro, M. Fernandes, R. Schwarz, G. Lavareda and C. N. Carvalho, "Self-biasing effect in colour sensitive photodiodes based on double p-i-n a-si:c:h heterojunctions" *Vacuum* 82, Issue 12 (2008), p. 1512.
- 52) M. Vieira, A. Fantoni, M. Fernandes, P. Louro, G. Lavareda and C. N. Carvalho, "Pinpi'n and pinpii'n multilayer devices with voltage controlled optical readout" *Journal of Nanoscience and Nanotechnology* 9 n°7 (2009), p. 4022.

- 53) A. Amaral, P. Brogueira, G. Lavareda and C. Nunes de Carvalho, "On the role of tin doping in InO_x thin films deposited by radio frequency-plasma enhanced reactive thermal evaporation"
Journal of Nanoscience and Nanotechnology 10 (2010), p. 2713.
- 54) P. Parreira, G. Lavareda, J. Valente, F. Nunes, A. Amaral and C. Nunes de Carvalho, "Undoped InO_x films deposited by radio frequency plasma enhanced reactive thermal evaporation at room temperature: importance of substrate"
Journal of Nanoscience and Nanotechnology 10 (2010), p. 2701.
- 55) P. Parreira, G. Lavareda, J. Valente, F. T. Nunes, A. Amaral and C. Nunes de Carvalho, "Optoelectronic properties of transparent p-type semiconductor Cu_xS thin films"
Physica Status Solidi A 207 (7) (2010), p. 1652.
- 56) Lavareda G., Parreira P., Valente J., Nunes F. T., Amaral A., Nunes de Carvalho C., "Highly transparent undoped semiconducting ZnO_x thin films deposited at room temperature by rf-PERTE"
Journal of Non-Crystalline Solids 356 (2010), p. 1392.
- 57) Costa J., Fernandes M., Vieira M., Lavareda G., N. Carvalho C., Karmali A., "Field effect and light assisted a-Si:H sensors for detection of ions in solution"
Sensor Letters 8 (2010) 493.
- 58) Ribeiro C., Brogueira P., Lavareda G., N. Carvalho Carlos, Amaral A., Santos L., Morgado J., Scherf U., D. B. Bonifácio Vasco., "Ultrasensitive microchip sensor based on boron-containing polyfluorene nanofilms"
Biosensors & Bioelectronics 26, Issue 4 (2010) p. 1662.
- 59) Parreira P., Lavareda G., Valente J., Conde O., Botelho do Rego A., Amaral A., Nunes de Carvalho C., "Transparent p-type Cu_xS thin films"
Journal of Alloys and Compounds 509, (2011) p.5099.
- 60) Parreira P., Torres É., Nunes C., Nunes de Carvalho C., Lavareda G., Amaral A., João Brites M., Dye-synsited Room-temperature sputter-deposited 1D anatase TiO₂ nanorods for photovoltaic applications.
Sensors & Actuators B: Chemical 161, (2012) p.901.
- 61) Lavareda G., Parreira P., Valente J., Nunes F. T., Amaral A., Nunes Carvalho C., "P-type CuO_x thin films by rf.PERTE: influence of rf power density"
Journal of Nanoscience and Nanotechnology 12 (2012) p. 6754.
- 62) A. Calheiros Velozo, G. Lavareda, C. Nunes de Carvalho, A. Amaral, Thermal dehydrogenation of amorphous silicon deposited on c-Si: effect of the substrate temperature during deposition.
Physica Status Solidi C 10-11 (2012) 2198-2202.
- 63) A. Amaral, P. Brogueira, O. Conde, G. Lavareda, C. Nunes de Carvalho, Device quality ITO and InO_x thin films deposited at room temperature with different rf-power densities.
Thin Solid Films 526 (2012) 221-224.
- 64) Calheiros Velozo A., Lavareda G., Nunes de Carvalho C., Amaral A., Thermal dehydrogenation of amorphous silicon: a time-evolution study.
Thin Solid Films 543 (2013) 48-50.
- 65) G. Lavareda, A. de Calheiros Velozo, C. Nunes de Carvalho, A. Amaral, P/n Junction Depth Control by Emitter Pre-deposition at Low Temperature.
Thin Solid Films 543 (2013) 122-124.
- 66) C. Nunes de Carvalho, P. Parreira, G. Lavareda, P. Brogueira, A. Amaral, P-type Cu_xS thin films: integration in a thin film transistor structure.
Thin Solid Films 543 (2013) 3-6.

- 67) C. Carvalho, G. Lavareda, A. Amaral, C. Nunes de Carvalho, N. Paulino, CMOS micro power switched-capacitor DC-DC step-up converter for indoor light energy harvesting applications.
Analog Integrated Circuits and Signal Processing 78 (2014) 333-351.
- 68) Merino E., Lavareda G., Brogueira P., Amaral A., Almeida P. L., Nunes de Carvalho C., InO_x thin films deposited by plasma assisted evaporation: application in light shutters.
Vacuum 107 (2014) 116.

6.4.3 Listagem das publicações em conferências internacionais do "ISI Proceedings".

- 1) L. Guimarães, R. Martins, E. Fortunato, I. Ferreira, M. Santos and N. Carvalho, "Use of $\mu\text{-Si:H}$ wide band gap n- and p-type materials for producing solar cells by a TCDDC system"
Materials Research Society Symposium Proceedings 118, Amorphous Silicon Technology (1988), p. 617.
- 2) R. Martins, L. Rodrigues, M. Vieira, E. Fortunato, M. Santos, E. Dirani, N. Carvalho, I. Baía and L. Guimarães, "Role of the species formed in PECVD systems on the density of states of a-Si films"
Materials Research Society Symposium Proceedings 192, Amorphous Silicon Technology (1990), p. 175.
- 3) C. Carvalho, J. M. M. de Nijs, R. Martins and L. Guimarães, "Role of SiO at TCO/p interface on the electrical properties of the p/i junction"
Materials Research Society Symposium Proceedings 219, Amorphous Silicon Technology (1991), p. 487.
- 4) R. Martins, I. Ferreira, C. N. Carvalho and L. Guimarães, "Engineering of PECVD systems for macroelectronics applications"
Materials Research Society Symposium Proceedings 258, Amorphous Silicon Technology (1992), p. 153.
- 5) E. Fortunato, M. Vieira, I. Ferreira, C. N. Carvalho, G. Lavareda and R. Martins, "Large area position sensitive detector based on amorphous silicon technology"
Materials Research Society Symposium Proceedings 297, Amorphous Silicon Technology (1993), p. 981.
- 6) M. Vieira, E. Fortunato, G. Lavareda, C. N. Carvalho and R. Martins, "Role of photodegradation on the $\mu\tau$ product and microstructure of a-Si:H pin devices"
Materials Research Society Symposium Proceedings volume 297, Amorphous Silicon Technology (1993), p. 637.
- 7) E. Fortunato, M. Vieira, N. Carvalho, G. Lavareda, F. Soares, R. Martins, "Performances presented by a position sensitive detector based on amorphous silicon technology"
Proceedings of SPIE – International Society of Photo-Optical Instrumentation Engineers 1985 (1993), p. 570.
- 8) M. Vieira, E. Fortunato, N. Carvalho, G. Lavareda, F. Soares, R. Martins, "Temperature and light induced degradation effect on a-Si:H photovoltaic PIN device properties"
Proceedings of SPIE – International Society of Photo-Optical Instrumentation Engineers 1985 (1993), p. 558.
- 9) E. Fortunato, C. N. Carvalho, A. Bicho, R. Martins, "Effect of different TCO interfaces on the performances presented by hydrogenated amorphous silicon p.i.n. solar cells"
IEEE First World Conference on Photovoltaic Energy Conversion, Vols. I and II, (1994), p. 646.

- 10) C. N. Carvalho, J. M. M. de Nijs, I. Ferreira, E. Fortunato and R. Martins, "Improvement of the ITO-p interface in a-Si:H solar cells using a thin SiO intermediate layer"
Materials Research Society Symposium Proceedings 420, Amorphous Silicon Technology (1996), p. 861.
- 11) C. N. Carvalho, J. M. M. de Nijs, I. Ferreira, E. Fortunato and R. Martins, "Improvement of the ITO-p interface in a-Si:H solar cells using a thin SiO intermediate layer"
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- 12) G. Lavareda, E. Fortunato, C. N. Carvalho and R. Martins, "Improved a-Si:H TFT performance using a-Si_xN_{1-x}/ a-Si_xC_{1-x} stack dielectrics"
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- 13) Yu. Vygranenko, M. Fernandes, C. Nunes de Carvalho, G. Lavareda, P. Louro, A. Amaral, R. Schwarz and M. Vieira, "Carrier transport and photogeneration in amorphous silicon/crystalline silicon heterojunctions with i/n and p/n interfaces"
Materials Research Society Symposium Proceedings 609, Amorphous and Heterogeneous Silicon Thin Films (2000), p. A 1321.
- 14) A. Amaral, G. Lavareda, C. Nunes de Carvalho, P. Brogueira, P. M. Gordo, V. S. Subrahmanyam, C. Lopes Gil, M. Duarte Naia and A. P. de Lima, "Study of defects in hydrogenated amorphous silicon by Constant Photocurrent Method and Positron Annihilation"
Materials Research Society Symposium Proceedings 664, Amorphous and Heterogeneous Silicon-Based Films (2001), p. A 22.5.1.
- 15) E. Fortunato, C. Nunes de Carvalho, A. Pimentel, G. Lavareda, A. Gonçalves, A. Marques and R. Martins, "Enhancement of the electrical properties of ITO on polymeric substrates by using a ZnO buffer layer"
Materials Research Society Symposium Proceedings 814, Flexible Electronics-Materials and Device Technology (2004), p. 231.
- 16) P. Louro, M. Vieira, A. Fantoni, M. Fernandes, C. Nunes de Carvalho and G. Lavareda "Two terminal large area single and double p-i-n device for image and color recognition"
Amorphous and Nanocrystalline Silicon Science and Technology 2004 Volume 808, Materials Research Society 2004, p. 495.
- 17) P. Louro, M. Fernandes, A. Fantoni, A. Maçarico, C. Nunes de Carvalho, G. Lavareda and M. Vieira, "Large area single and stacked p-i-n photodiode as a colour image sensors"
Silicon Carbide 2004 - Materials, Processing and Devices Volume 815, Materials Research Society 2004, p. 311.
- 18) M. Vieira, M. Fernandes, P. Louro, A. Fantoni, Yu. Vygranenko, G. Lavareda and C. Nunes de Carvalho, "Image and color sensitive detector based on two double p-i-n a-SiC:H photodiodes"
Amorphous and Nanocrystalline Silicon Science and Technology-2005 Volume 862, Materials Research Society (2005), p. 685.
- 19) P. Louro, M. Vieira, M. Fernandes, A. Fantoni, M. Fernandes, G. Lavareda and C. Nunes de Carvalho, "Spectral sensitivity and color selectivity in multilayer stacked devices"
Amorphous and Nanocrystalline Silicon Science and Technology-2005 Volume 862, Materials Research Society (2005), p. 673.
- 20) M. Fernandes, A. Fantoni, M. Niehus, P. Louro, G. Lavareda, C. Nunes de Carvalho and M. Vieira, "Fine tuning of the spectral collection efficiency in a multilayer junction through the LSP technique"
Materials Research Society Symposium Proceedings 872, Micro and Nanosystems - Materials and Devices - 2005, p. 117.

- 21) M. Vieira, P. Louro, A. Fantoni, M. Fernandes, G. Lavareda and C. Nunes de Carvalho, "Band gap engineering and electrical field tailoring for voltage controlled spectral sensitivity"
Amorphous and Polycrystalline Thin-Film Silicon Science and Technology 2006 Volume 910 Materials Research Society Symposium (2007), p. 403.
- 22) P. Louro, A. Fantoni, M. Fernandes, G. Lavareda, C. Nunes de Carvalho and M. Vieira "Improvement in pinpin device architectures for imaging applications"
Amorphous and Polycrystalline Thin-Film Silicon Science and Technology-2008 Volume 1066, Materials Research Society Symposium (2008), p. 407.
- 23) Costa J., Fernandes M., Vieira M., Lavareda G., Carvalho Nunes C., Karmali A., "Electronic detection and quantification of ions in solution using a-Si:H field-effect device"
Materials Research Society Symposium Proceedings 1153, Amorphous and Polycrystalline Thin-Film Silicon Science and Technology (2009), p. A19-06.
- 24) Louro P., Vieira M., Vieira M. A., Fernandes M., Fantoni A., Lavareda G., Carvalho Nunes C., "Optical processing devices for optical communications: multilayered a-SiC:H architectures"
Materials Research Society Symposium Proceedings 1153, Amorphous and Polycrystalline Thin-Film Silicon Science and Technology (2009), p. A19-01.
- 25) Fantoni A., Fernandes M., Louro P., Lavareda G., Carvalho N. C., Vieira M., "Fine tuning of the spectral sensitivity in a-SiC:H stacked p-i-n graded cells"
Materials Research Society Symposium Proceedings 1153, Amorphous and Polycrystalline Thin-Film Silicon Science and Technology (2009), p. A19-02.

6.4.4 Listagem das publicações em revistas nacionais

- 1) R. Martins, E. Fortunato, I. Ferreira, L. Guimarães, A. Maçarico, N. Carvalho, "Incremento das características apresentadas pelas células solares de Si:H-a usando camadas dopadas de elevado hiato óptico e baixa absorção e camadas de bloqueio"
Energia Solar 18 (1988), p. 57.
- 2) M. Vieira, R. Martins, E. Fortunato, M. Santos, A. Maçarico, N. Carvalho and L. Guimarães, "Role of carbon incorporation on structural and transport properties of a/ μ c-Si:C:H films"
Portugaliae Physica. 20 (1989/91), p. 21.
- 3) S. Soalheira, R. Martins, C. Carvalho, I. Baía and L. Guimarães, "Optoelectronic properties presented by doped and undoped amorphous silicon films"
Portugaliae Physica. 20 (1989/91), p. 40.

6.5 Participação em congressos internacionais

- Congress of the International Solar Energy Society (ISES), Madrid, Espanha (1982).
- 1º Congresso Ibérico da Física da Matéria Condensada, Lisboa, Portugal (1983).
- 6th E. C. Photovoltaic Solar Energy Conference, Londres, Inglaterra (1985).
- I Reunião Ibérica do Vazio e suas Aplicações / VII Reunion Espanhola del Vacio y sus Aplicaciones / I Reunião Portuguesa de Vácuo, Braga, Portugal (1988).
- 4º Congresso Ibérico; 2º Iberoamericano de Energia Solar, Porto, Portugal (1988).

- Euroforum New Energies, Congress and Exhibition, Saarbrucken, Alemanha (1988).
- 9th European Photovoltaic Solar Energy Conference, Freiburg, Alemanha (1989).
- 10th E. C. Photovoltaic Solar Energy Conference, Lisboa, Portugal (1991).
- 6th International Photovoltaic Solar Energy Conference, Nova Deli, Índia (1992).
- 11th E. C. Photovoltaic Solar Energy Conference, Monterux, Suíça (1992).
- II Reunião Ibérica do Vácuo e suas Aplicações e 1st European Topical Conference on Hard Coatings, Alicante, Espanha (1993).
- III) Reunião Ibérica do Vácuo e suas Aplicações e 2st European Topical Conference on Hard Coatings, Lisboa, Portugal (1997).
- 1st World Conference on Photovoltaic Energy Conversion, WCPEC-IEEE, Hawaii, USA (1994).
- European Materials Research Society, Estrasburgo, França (1999).
- European Materials Research Society, Estrasburgo, França (2000).
- 1st International Materials Symposium (Materiais 2001), Coimbra, Portugal (2001).
- European Materials Research Society, Estrasburgo, França (2001).
- 19th International Conference on Amorphous and Microcrystalline Semiconductors, ICAMS 19, Nice, França (2002).
- European Materials Research Society, Estrasburgo, França (2002).
- European Materials Research Society, Estrasburgo, França (2003).
- II International Materials Symposium (Materiais 2003), Lisboa, Portugal (2003).
- European Materials Research Society, Estrasburgo, França (2004).
- First Conference on Advances in Optical Materials (AIOM), Tucson, USA (2005).
- European Materials Research Society, Spring Meeting, Estrasburgo, França (2007).
- 2nd International Conference on Advanced Nano Materials (ANM), Aveiro, Portugal (2008).
- European Materials Research Society, Spring Meeting, Estrasburgo, França (2009).
- 3th International Conference on Advanced Nano Materials (ANM), Agadir, Marrocos (2010).
- NanoSea, Sardenha, Italy (2012).

7. WORKSHOPS; ENCONTROS

I – 2nd Workshop on CVD Thin Film Technologies (Time-Modulated CVD Technologies, TIMOC), Lisbon, Portugal, 6-7 December, 2001, “PECVD silicon nitrides-correlation between gas flow and film composition”.

II – 2nd aSiNet Workshop in Thin Silicon/9th Euroregional Workshop on Thin Silicon Devices, Lisbon, Portugal, 19-21 February, 2003, poster presentation of “Properties of ITO thin films deposited by rf-PERTE on unheated polymer substrates-dependence on oxygen partial pressure”.

III – VI Seminário Iberoamericano de Mostradores de Informação – VI InfoDisplay, Fortaleza – Ceará, Brasil, 2003.

IV - LatinDisplay 2007 a realizar de 12 a 15 de novembro de 2007, como membro de sua Comissão de Programa, Campinas, SP, Brasil, 2007.

8. ÓRGÃOS DE GESTÃO

- Coordenador do Mestrado em Engenharia de Materiais (6^a; 7^a e 8^a Edições) e do Programa de Doutoramento em Engenharia dos Materiais (1^a e 2^a Edições, FCT-UNL (1999/00-2001/04).
- Vogal da Sociedade Portuguesa de Vácuo (1996/2003).
- Presidente do Comité Local para a organização da III RIVA and ETCHC-2 (III Reunião Ibérica de Vácuo e 2nd European Topical Conference on Hard Coatings), 22-24 Setembro, Lisboa, Portugal (1997).
- Membro do Comité de Programação para a organização da IV RIVA (IV Reunião Ibérica de Vácuo), 13-15 Julho, Ávila, Espanha (2000).
- Membro da Comissão Directiva do Centro de Física Molecular da UTL (1996/2002)
- Membro da Comissão para Avaliação da Licenciatura em Engenharia de Materiais da FCT-UNL (1996/97).
- Membro do Comité Científico para a organização da V RIVA (V Reunião Ibérica de Vácuo), 18-21 Setembro, Universidade do Minho, Portugal (2005).
- Membro do Comité de Programação da LatinDisplay 2007, Rede Brasileira de Mostradores de Informação, Campinas, São Paulo, Brasil (2007).
- Membro do Comité de Programação da LatinDisplay 2008, Campinas, São Paulo, Brasil (2008).

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