instituto de telecomunicações

ORGANIC ELECTRONICS GROUP

OE-lx

What is Organic Electronics

Organic Electronics is an emerging technology based on organic materials, such as plastics, which aims at low-cost, lightweight and flexible electronic components for displays, solar cells, sensors and circuits, that can be printed on anything and placed anywhere. In this technology, organic conductors and semiconductors are used instead of silicon.

Who We Are

The Organic Electronics Group (OE-Lx) at Instituto de Telecomunicações, in LIsbon, is a multidisciplinary research group of experts in the design and synthesis of semiconducting polymers and molecular conductors and on the manufacture and characterization of organic electronic devices, such as thin film transistors, photovoltaic solar cells, light emitting diodes and memories. A more basic research subject focuses on molecular devices and molecular wires.

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COVILHÃ

What We Do

Current Research Topics

1. Materials Preparation: Semiconducting and Electroluminescent Polymers and Molecules.
2. Solar Cells. Organic photovoltaics (OPVs), Perovskyte-based solar cells.
3. OFETs and OLEDs.
4. Implantable Organic Nano-electronics.
5. Organic printed electronics.
6. Non-volatile resistive switching memories.
7. Unimolecular devices.
8. Quantum chemical calculations.

Running Projects

National Projects

1. **Artificial Leaves**: Development of low cost, light weight, flexible (foldable and rollable), ionic current organic photovoltaic cells (OPVCs) based on water-soluble photoactive polymers and sensitizer dyes embedded in a biocompatible matrix. FCT
2. **LIQ-OPVs**: Towards very efficient organic photovoltaic cells through utilizing liquid crystal phases as electron-acceptors. FCT
3. **NOVO**: Non volatile polymer memories for flexible electronics. FCT
4. **STM Image:** Scanning Tunneling Microscopy Image Processing Tools

European Projects (5)

1. FlexNet: Network of excellence for building up Knowledge for better System Integration for Flexible Organic and Large Area Electronics (FOLAE) and its exploitation.

2. I-One: Implantable Organic Nano-Electronics.

3. TDK4PE: Technology & Design Kit for Printed Electronics.

4. POCAONTAS: Marie Curie training network that aims to explore the use of carbon nanotubes in photovoltaic cells.

5 PHOCS: aims to explore the use of conjugated polymers in photoelectrochemical cells that can produce hydrogen.

OE.Ix Publications in 2014

Book chapters

1. Gomes, H.L.; Gomes, H.L.; "Chapter 3-Molecular, Polymer and hybrid organic memory devices (OMDs)" - Chapter in Advances in Non-volatile Memory and Storage Technology, Y. Nishi,, Woodhead Publishing, , 2014.
2. G. Bernardo; Morgado, J.; "Fluorescence spectroscopy" - Chapter in Characterization of Polymer Blends: Miscibility, Morphology and Interfaces, S. Thomas, Y. Grohens, P. Jyotishkumar, Wiley, 2014

Papers in Journals

1. R. Rodrigues; Meira, R.; Ferreira, Q. ; Charas, A.; Morgado, J.; "Improving the Efficiency of Organic Solar Cells upon Addition of Polyvinylpyridine", Materials, Vol. 7, No. 12, pp. 8189 - 8196, December, 2014

2. B.F. Bory; J. Wang; Gomes, H.L.; "Lithium Fluoride Injection Layers Can Form Quasi-Ohmic Contacts for Both Holes and Electrons", *Applied Physics Letters*, Vol. 105, No. 23, pp. 123302 - 123306, December, 2014.

3. Braz, T.; Ferreira, Q. ; Mendonça, A.; A. M. Ferraria Ferraria; A. Rego; Morgado, J.; "Morphology of Ferroelectric/Conjugated Polymer Phase-Separated Blens Used in Nonvolatile Resistive Memories. Direct Evidence for a Diffuse Interface.", *Journal of Physical Chemistry C*, Vol. -, No. -, pp. - - -, December, 2014.

4. Salvador , M.; "Nanoscale Surface Potential Variation Correlates with Local S/Se Ratio in Solution-Processed CZTSSe Solar Cells", *Nano Letters*, Vol. 14, No. 12, pp. 6926 - 6930, November, 2014.

5. A.L. Lourenço; R.V. Viveiros; A. M. Moro; JC Lima; Bonifácio, V.B.; TC Casimiro; "Supercritical CO2-assisted synthesis of an ultrasensitive amphibious quantum dot-molecularly imprinted sensor", *RSC Advances*, Vol. 108, No. 4, pp. 63338 - 63341, November, 2014.

6. R.R. Restani; A. Bragança; Morgado, J.; Bonifácio, V.B.; "Polyurea dendrimer for efficient cytosolic siRNA delivery", *RSC Advances*, Vol. 97, No. 4, pp. 54872 - 54878, October, 2014.

7. B.F.. Bory; P. R. F. Rocha; Gomes, H.L.; "Lithium fluoride injection layers can form quasi-Ohmic contacts for both holes and electrons", *Applied Physics Letters*, Vol. 105, No. 12, pp. 123302 - 123305, September, 2014.

8. Neves; I. C. Santos; J.T.C. Coutinho; L. Pereira; Henriques, R. T.; E. B. Lopes; H. Alves; M. Almeida; D. Belo; "5-Methylthiophene-2,3-dithiolene Transition Metal Complexes", *European Journal of Inorganic Chemistry*, Vol. 284, No. 8, pp. 3989 - 3999, August, 2014.

9. Bonifácio, V.B.; A. Bragança; M. Araújo; "Polyurea Dendrimer-Perylene Self-Imprinted Nanoshells for Trace Explosive Detection", *Particle & Particle Systems Characterization*, Vol. n.a., No. n.a., pp. n.a. - n.a., August, 2014.

10. G. S. Spyropoulos; Salvador , M.; "Flexible organic tandem solar

modules with 6% efficiency: combining roll-to-roll compatible processing with high geometric fill factors", *Energy & Environmental Science*, Vol. 7, No. -, pp. 3284 - 3290, July, 2014.

11. M. Araújo; R.V. Viveiros; T. C. Correia; IC Correia; Bonifácio, V.B.; TC Casimiro; AAR Aguiar-Ricardo; "Natural melanin: A potential pH-responsive drug release device", *Intrnl. Journal of Pharmaceutics*, Vol. 469, No. 1, pp. 140 - 145, July, 2014.
12. Salvador , M.; "Performance limits of plasmon-enhanced organic photovoltaics", *Applied Physics Letters*, Vol. 105, No. 033304, pp. 033304-1 - 033304-5, July, 2014.
13. A.L. Lourenço; TC Casimiro; Bonifácio, V.B.; "Reborn water-soluble CdTe quantum dots", *Talanta*, Vol. 125, No. n.a., pp. 319 - 321, July, 2014.
14. Salvador , M.; "Edge-Gold-Coated Silver Nanoprisms: Enhanced Stability and Applications in Organic Photovoltaics and Chemical Sensing", *Journal of Physical Chemistry C*, Vol. 118, No. 23, pp. 12459 - 12468, May, 2014.
15. R. Rodrigues; Ferreira, Q. ; Mendonça, A.; Morgado, J.; "Template role of polyhexylthiophene nanowires on efficient bilayer photovoltaic cells", *Synthetic Metals*, Vol. 190, No. n/a, pp. 72 - 78, April, 2014.
16. D. Suresh; P. S. Lopes; B. F. Ferreira; C. A. F. Figueira; C. S. B. Gomes; P. Gomes; R. Paolo; A. Maçanita; Charas, A.; Morgado, J.; "Tunable Fluorophores Based on 2-(N-Arylimino)pyrrolyl Chelates of Diphenylboron: Synthesis, Structure, Photophysical Characterization, and Application in OLEDs", *Chemistry A. European Journal*, Vol. 20, No. 14, pp. 4126 - 4140, April, 2014.
17. Salvador , M.; "A General Route to Enhance Polymer Solar Cell Performance using Plasmonic Nanoprisms", *Advanced Energy Materials*, Vol. 4, No. 9, pp. 1400206-1 - 1400206-7, March, 2014.
18. Ferreira, Q.; A. Bragança; Alcácer, L.A.; Morgado, J.; "Conductance of Well-Defined Porphyrin Self-Assembled Molecular Wires up to 14 nm in Length", *Journal of Physical Chemistry C*, Vol. 118, No. 3, pp. 7229 - 7234, March, 2014

19. Brotas, G.; Farinhas, J.; Ferreira, Q. ; R. Rodrigues; I.L. Martins; Morgado, J.; Charas, A.; "Synthesis, characterization, and applications in photovoltaic cells of oxetane-functionalized P3HT derivatives", *Journal of Polymer Science: Part A: Polymer Chemistry*, Vol. 52, No. 5, pp. 652 - 663, March, 2014.

20. H. N. Nagaoka; Salvador, M.; "Size-Dependent Charge Transfer Yields in Conjugated Polymer/Quantum Dot Blends", *Journal of Physical Chemistry C*, Vol. 118, No. 11, pp. 5710 - 5715, February, 2014.

21. MG Gawande; Bonifácio, V.B.; RL Luque; PB Branco; RV Varma; "Solvent-Free and Catalysts-Free Chemistry: A Benign Pathway to Sustainability", *ChemSusChem*, Vol. 7, No. 1, pp. 24 - 44, January, 2014.

The OE Lisbon Group

The U. Algarve Lab