

## Overview

### 1. Personal data

#### Full Name

Helena Isabel Pereira da Costa Aguilar Ribeiro

#### Name under which you publish

Aguilar Ribeiro, H.

#### Fiscal ID number

203256034

#### ID document

10263493

#### Birth date

03-03-1974

#### National of

Portugal

#### Gender

F

#### Work address

Faculdade de Engenharia da Universidade do Porto, Dep. de Engenharia Química  
Rua Dr. Roberto Frias  
4200-465 Porto  
Portugal

#### Residential Address

Rua de S. Paulo, 198  
4760-679 Vila Nova de Famalicão - Antas  
Portugal

#### Work Phone

252 508 1589

#### Residential Phone

#### Email

haguilar@fe.up.pt

#### Fax

22 508 1449

#### Cell phone

966268397

#### URL

[http://www.fe.up.pt/si/FUNCIONARIOS\\_GERAL.formview?p\\_codigo=421694](http://www.fe.up.pt/si/FUNCIONARIOS_GERAL.formview?p_codigo=421694)

### 2. Academic degrees

**Year:** 1997

**Degree:** LICENCIATURA

**Final grade:** 14/20

**Degree granting institution** Universidade do Porto

**School/College/Campus** Faculdade de Engenharia

**Thesis title**

**Supervisor:**

**Co-supervisor:**

**Scientific area** Engenharia Química

**Number of curricular years** 0

**Program title**

**Year:** 2006

**Degree:** DOUTORAMENTO

**Final grade:** Concluido

**Degree granting institution** Universidade do Porto

**School/College/Campus** Faculdade de Engenharia

**Thesis title** Study of Rheology of Deformable Porous Media: Application to Paper Production

**Supervisor:** Carlos Albino Veiga da Costa, Prof.

**Co-supervisor:**

**Scientific area** Engenharia Química

**Program title -**

**Year:** 1992

**Degree:** ENSINO SECUNDÁRIO

**Final grade:** 19/20

**Degree granting institution** Escola Secundária Camilo Castelo Branco

**School/College/Campus** n/a

**Thesis title**

**Supervisor:**

**Co-supervisor:**

**Scientific area**

**Number of curricular years** 0

**Program title**

### 3. Previous activity and current status

Período	Cargo, categoria ou actividade	Instituição
a Auxiliar Researcher (Program Ciência 2007)	Faculdade de Engenharia da Universidade do Porto, LEPAE - Laboratório de Engenharia de Processos, Ambiente e Energia	
a Post-doc student	Faculdade de Engenharia da Universidade do Porto, LEPAE - Laboratórios de Engenharia de Processos, Ambiente e Energia	
a PhD student	Faculdade de Engenharia da Universidade do Porto	
a Young researcher (BI)	Faculdade de Engenharia da Universidade do Porto, LEPAE - Laboratório de Engenharia de Processos, Ambiente e Energia	

### 4. Area of scientific activity

In the course of the PhD, the main research topic was focus on rheology of deformable porous media, heat and mass transfer with phase change in porous materials, modeling, simulation, study of the impulse drying process of paper (high-temperature pressing of paper webs in the press section of a paper machine).

Since 2006, the main research fields are focused on the development of Dye-sensitized solar cells (DSC), also known as Graetzel cells, and hydrogen production from photoelectrochemical cells (PEC cells). These research topics rely on the development of phenomenological models based in unsteady-state equations able to describe the intrinsic charge transfer phenomena occurring in photoelectrochemical cells. Validation of these models is performed by means of impedance analysis, namely Electrochemical Impedance Spectroscopy (EIS) and Intensity Modulated Photovoltage/Photocurrent Spectroscopy (IMVS/IMPS). These research work started at LEPAE (Laboratory of Process, Environment and Energy Engineering, Faculty of Engineering at the University of Porto) in 2006 and took advantage of a fruitful collaboration with the Energy Research Centre of the Netherlands (ECN, Dr. Jan Kroon and Dr. Paul Sommeling).

Since 2007, there is a strong collaboration with the inventor of DSC, Professor Michael Graetzel from the Laboratory of Photonics and Interfaces (LPI) at the École Polytechnique Federale de Lausanne (EPFL). He is collaborating in the development of new materials and methodologies targeting higher efficiencies and long-term stability of DSC and photoelectrochemical cells for hydrogen production.

Very recently, a patent on the laser sealing of glass based DSC was submitted, which was also co-authored by Prof. Graetzel.

Ultimately, the present research activity aims at contributing to the development, and exploitation in a near future, of Dye-sensitized solar cells and PEC cells.

Ongoing research work is focused on the development of novel biomaterials and bioinspired materials to act as nanostructured semiconductors for solar energy applications and low-cost large-scale photosensors.

## 5. Present research interest

### Domain of specialization

Chemical Engineering

### Current research interests

Study of nanocrystalline dye-sensitized solar cells (DSC). DSC, or Graetzel cells are very promising in terms of performance and applications, but there are still some bottlenecks to be solved. These are mainly related to long-term outdoor stability of DSC cells and modules. Impedance analysis and phenomenological modeling and simulation allow the investigation of the main electron loss routes (recombination reactions) occurring in DSC under normal operating conditions. Relevant information can be withdrawn from this type of approach, which may ultimately help to define the best strategy for materials development and optimization.

### Other professional interests/activities

- Collaboration with European research groups in the field of "Dye-sensitized Solar Cells", namely the Energy research Centre of the Netherlands (ECN, The Netherlands), the Instituto de Tecnologia Química (ITQ, Spain), and the Ecole Federale de Lausanne (EPFL, Switzerland)
- Expertise in semiconductor deposition and coating techniques onto glass substrates for DSC, as well as in all stages of the DSC manufacturing process: sintering of materials, dye adsorption onto the semiconductors surface, polymer and laser based sealing procedures, etc.
- Expertise in Electrochemical Impedance Spectroscopy and Intensity Modulated Photo Spectroscopy for the study of photoelectrochemical cells
- Expertise in modeling and simulation of unsteady-state phenomena.
- Supervision of PhD studies in related areas.
- Collaboration in teaching classes and supervision of undergraduate students.
- Participation in national and european projects in related areas.

## 6. Experience as scientific adviser

- Co-supervision of PhD thesis:

2006 - 2010: Luisa Manuela Madureira Andrade (SFRH/BD/30464/2006); "Estudo e caracterização de células solares de Grätzel" (Study and characterization of Grätzel solar cells); Faculty of Engineering at the University of Porto. Supervisor: Prof. Adélio Mendes (FEUP).

2008 - 2011: Rui Alberto Teixeira Cruz (SFRH/bde/33439/2008); "Optimização e "upscaling" de células solares de Grätzel para sistemas de microgeração de energia" (Optimization and upscaling of Graetzel solar cells for energy microgeneration systems); Faculty of Engineering at the University of Porto. Supervisor: Prof. Adélio Mendes (FEUP), co-supervisor: Eng. Fernando Vaz (EFACEC).

2007-2008: Luís Francisco Moreira Gonçalves (SFRH/BD/36791/2007); "Síntese, caracterização e estudo de filmes finos nanoestruturados de dióxido de titânio para aplicação em células solares de Grätzel" (Synthesis, characterization of nanostructured titania thin films for Grätzel solar cells), Supervisor: Prof. Adélio Mendes (FEUP), co-supervisor: Prof. Verónica de Zea Bermudez (Universidade de Trás-os-Monte e Alto Douro).

2009-2011: Tânia Sofia Teixeira Lopes (SFRH/BD/62201/2009); "Caracterização e modelização fenomenológica de células foto-electroquímicas para produção de hidrogénio a partir de energia solar." (Characterization and phenomenological modeling of photoelectrochemical cells for hydrogen production from solar energy), Supervisor: Prof. Adélio Mendes (FEUP)

## 7. Participation in R&D projects

### Participação em projectos de investigação (coordenador/membro de equipas)

1998-2001: European project entitled "High Temperature Pressing of Fibrous Materials / Non-Nuclear Energy Programme", ref. JOE3-CT97-0078, partly supported by the European Commission. This work was performed in the framework of the PhD thesis entitled "Study of the Rheology of Deformable Porous Media: Application to Paper Production". Project team member.

2009-2010: European project entitled "NanoPEC: Nanostructured Photoelectrodes for Energy Conversion", coordinated by Prof. Michael Graetzel (EPFL). Other participants: Delft University of Technology (Dr. Roel van de Krol, NL), Technion-Israel Institute of Technology (Dr. Avner Rothschild, Israel), University of Warsaw (Prof. Jan Augustynski, Poland), ENI S.p.A. (Italy) and University of Oslo (Prof. Andrej Kuznetsov, Norway). Total budget: € 3 489 000. Project team member.

2009-2011: National project (QREN) entitled "SolarSel: Development of an innovating and assemblage system for DSC", coordinated by EFACEC Engenharia SA. Other participants: FEUP, CIN SA, CUF-QI SA and EDP Inovação. Total budget: € 967 576. Responsible at FEUP (Prof. Adélio Mendes).

Projects approved by FCT:

2010: National project (FCT) entitled "DyeCell Modeling, optimization and up-scaling of nanostructured materials for robust dye-sensitized solar cells", coordinated by FEUP, in collaboration with the Faculty of Sciences at University of Porto. Total budget: € 168.045,00. Responsible at FEUP. (PTDC/EQU-EQU/101397/2008)

2010: National project (FCT) entitled "H2Solar - Photoelectrochemical cells for hydrogen production from solar energy", coordinated by FEUP, in collaboration with the Faculty of Sciences at University of Porto. Total budget: € 173.366,00. Responsible at FEUP. (PTDC/EQU-EQU/107990/2008)

## 8. Prizes and awards received

Year	Name of the prize or award	Promoting entity
2009	Prémio Incentivo Científico	Faculdade de Engenharia da Universidade do Porto

## 9. Published works

### Teses

Aguilar Ribeiro, H. "Study of the Rheology of Deformable Porous Media: Application to Paper Production", PhD. Thesis, Faculty of Engineering of University of Porto, Portugal, 2006.

### Capítulos de livros

Andrade, L., Aguilar Ribeiro, H., Mendes, A. (2010). "Dye-Sensitized Solar Cells: an Overview", Energy Production and Storage, Robert H. Crabtree (Ed.), John Wiley & Sons, Ltd. (ISBN 978-0-470-74986-9).

Aguilar Ribeiro, H., Carvalho, L., Martins, J., Costa, C.A.V. (2011). "Transport Phenomena in Paper and Wood-based Panels Production" in Mass Transfer in Multiphase Systems and its Applications, Mohamed El-Amin (Ed.), Intech. (ISBN 978-953-307-215-9).

### Artigos em revistas de circulação internacional com arbitragem científica

Paula Mendes, Helena Aguilar, João Ranita, Mohamed Naceur Belgacem, Jacques Silvy and Carlos A. V. Costa, "The Influence of Impulse Drying on the Performances of Papers Containing Cationic Starch and Calcium Carbonate", Tappi Journal, 1(9): 10-15, 2002.

Paula Mendes, Mohamed Naceur Belgacem, Helena Aguilar, João Ranita, Ana Paula Costa, Jacques Silvy and Carlos A. V. Costa, "Impulse Drying Effect on Properties of Paper Made from Hardwood and Softwood Portuguese Pulp", Paperi ja Puu, 84 (3): 263-268, 2002.

Aguilar Ribeiro, H. and Costa, C.A.V., "Modelling and simulation of the non-linear behaviour of paper: a cellular materials approach", Chemical Engineering Science, 62, 6696-6708, 2007.

Aguilar Ribeiro, H. and Costa, C.A.V., "Modeling and simulation of the hot-pressing process in paper production: a heat and mass transfer analysis", Industrial & Engineering Chemistry Research, 46(24), 8205-8219, 2007.

Aguilar Ribeiro, H. and Costa, C.A.V., "A mechanical model for felt in impulse drying: a cellular materials approach – Part I. Model development and simulation", Fibers & Polymers, 9(1), 55-62, 2008.

Aguilar Ribeiro, H. and Costa, C.A.V., "A mechanical model for felt in impulse drying: a cellular materials approach – Part II. Experimental validation", Fibers & Polymers, 9(1), 63-70, 2008.

Andrade, L., Sousa, J.M., Aguilar Ribeiro, H., Mendes, A., "Phenomenological Modeling of Dye-sensitized Solar Cells under Transient Conditions", Solar Energy, 85(5), 781-793, 2011.

Andrade, L., Lopes, T., Aguilar Ribeiro, H., Mendes, A., "Transient phenomenological modeling of photoelectrochemical cells for water splitting – Application to undoped hematite electrodes", International Journal of Hydrogen Energy, 36(1), 175-188, 2011.

Cruz, R., Ranita, J., Maçaira, J., Ribeiro, F., Silva, A.M.B., M., Fernandes, H.V., Oliveira, J.M., Aguilar Ribeiro, H., Mendes, J., Mendes, A., "Glass-glass laser-assisted glass frit bonding", Transactions on Components, Packaging and Manufacturing Technology (accepted for publication, 2012)

Aguilar Ribeiro, H., Sommeling, P.M., Kroon, J.M., Mendes, A. and Costa, C.A.V., "Dye-sensitized solar cells: novel concepts, materials and state-of-the-art performances", International Journal of Green Energy, 6(3), 245 - 256, 2009.

Gonçalves, L.M., Bermudez, V., Aguilar Ribeiro, H., Mendes, A.M., "Dye-sensitized solar cells: A safe bet for the future", Energy & Environmental Science, 1(6), 655-667, 2008.

Andrade, L., Zakeeruddin, S.M., Nazeeruddin, Md.K., Aguilar Ribeiro, H., Mendes, A., Graetzel, M., "Influence of different cations of N3 dyes on their photovoltaic performance and stability", International Journal of Chemical Engineering, Vol.2009, pp.7 pages-, 2009.

Andrade, L., Zakeeruddin, S.M., Nazeeruddin, M.K., Aguilar Ribeiro, H., Mendes, A., Graetzel, M., "Influence of Sodium Cations of N3 Dye on the Photovoltaic Performance and Stability of Dye-Sensitized Solar Cells", ChemPhysChem, Vol.10, pp.1117-1124, 2009.

Lopes, T., Andrade, L., Aguilar Ribeiro, H., Mendes, A., "Characterization of Photoelectrochemical Cells for Water Splitting by Electrochemical Impedance Spectroscopy", International Journal of Hydrogen Energy, (35) 20, 11601-11608, 2010.

Andrade, L. Cruz, R., Aguilar Ribeiro, H., Mendes, A., "Impedance characterization of Dye-sensitized Solar Cells in a tandem arrangement for hydrogen production by water splitting", International Journal of Hydrogen Energy, 35(17), 8876-8883, 2010.

#### **Publicações em actas de encontros científicos**

Aguilar Ribeiro, H., Costa, C.A.V., "A Proposed Model in the Analysis of Impulse Drying of Paper", Proceedings of the 2003 International Paper Physics Conference, p. 305-309, Victoria, BC, Canada, 7-11 September 2003.

Aguilar Ribeiro, H., Costa, C., "A Rheological Model of the Paper Fiber Network in Impulse Drying: a Cellular Materials Approach", Proceedings of the 2002 Progress in Paper Physics: A Seminar, p. 68-72, SUNY-ESF, Finger Lakes, New York, 8-13 September 2002.

Aguilar, H.I.P.C., Nunes da Costa, Mário Rui P.F., Costa, Carlos A.V., "Application of TMA to the study of physical and rheological properties of paper webs", 7ª Conferência Internacional de Engenharia Química, 189-195, 1998.

Paula Mendes, Mohamed Naceur Belgacem, Jacques Silvy, Helena Aguilar, João Ranita and Carlos A. V. Costa, "Effect of Impulse Drying on the Properties of Paper Made from Bleached Kraft Pulps of Eucalyptus globules", Proceedings of 2000 International Paper Physics, Progress in Paper Physics: A Seminar, Grenoble, France, Vol. 2, 101-108, 11-15 September 2000.

Aguilar Ribeiro, H., Sommeling, P.M., Kroon, J.M., Mendes, A. and Costa, C.A.V., "Dye-sensitized solar cells: novel concepts, materials and state-of-the-art performances", Proc. of The 3rd International Energy, Exergy and Environment Symposium (IEEEES-3), 1-5 July 2007 Évora, Portugal.

Aguilar Ribeiro, H., Bakker, N.J., Smit, H.J.P., Budel, T., Sommeling, P.M., Kroon, J.M., Mendes, A. and Costa, C.A.V. "Analysis of the stability of dye-sensitized solar cells by electrochemical impedance spectroscopy", Proc. of the NanoSmat07 – International Conference on Surfaces, Coatings and Nanostructured Materials, 9 -11 July 2007, Algarve, Portugal.

T. Lopes, A. Mendes, L. Andrade, H. Aguilar Ribeiro, "Characterization of photoanodes for water splitting by electrochemical impedance spectroscopy", EIS 2010 - International Symposium on Electrochemical Impedance Spectroscopy, Algarve, Portugal, June 6-11, 2010.

R. Cruz, A. Tanaka, L. Brandão, H.A. Ribeiro, A. Mendes, "Single wall carbon nanohorns as counter-electrodes for dye-sensitized solar cells", 10th National Meeting on Photochemistry, Porto, Portugal, December 9-10, 2010.

Apolinário, C.T Sousa, J.D. Costa, J. Azevedo, J. Ventura, H.A. Ribeiro, A.M. Mendes, J. P. Araújo "Thickness and order enhancement in arrays of TiO<sub>2</sub> nanotubes through a simple electropolishing pre-treatment", ImagineNano-TNA Trends in NanoApplications Energy, Bilbao, Spain, April 2011.

Duarte, A.C.,

R. Cruz, A. Tanaka, H. Aguilar Ribeiro, A. Mendes, "Carbon-based nanomaterials as counter electrodes for dye-sensitized solar cells", 2nd Nanotechnology for Sustainable Energy - ESF-FWF Conference, Obergurgl, Austria, July 4-9, 2010.

J.D. Costa, A. Apolinário, J. Azevedo, C.T. Sousa, J. Ventura, H.A. Ribeiro, A.M. Mendes, J.P. Araújo, "Growth control of TiO<sub>2</sub> nanotubes for dye-sensitized solar cell", IJUP 2011 (Young Research in Porto University), Porto, Portugal, February 2011.

J.D. Costa, A. Apolinário, J. Azevedo, C.T. Sousa, J. Ventura, H.A. Ribeiro, A.M. Mendes, J.P. Araújo, "Growth control of TiO<sub>2</sub> nanotubes for dye-sensitized solar cell", VI Jornadas do IFIMUP, Porto, Portugal, February 2011.

Apolinário, C.T Sousa, J.D. Costa, J. Azevedo, J. Ventura, H.A. Ribeiro, A.M. Mendes, J. P. Araújo, "Thickness and order enhancement in arrays of TiO<sub>2</sub> nanotubes through a simple electropolishing pre-treatment", VI Jornadas do IFIMUP, Porto, Portugal, February 2011.

J. Azevedo, C.T. Sousa, J.D. Costa, A. Apolinário, J. Ventura, H. A. Ribeiro, A. M. Mendes, J. P. Araújo, "Synthesis of a  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> nanowires arrays by pulsed electrodeposition of Fe in alumina templates", EDNANO (8th International Workshop on Electrodeposited Nanostructures), Milan, Italy, March 2011.

S. Magalhães, H. Aguilar Ribeiro, A. Mendes, "Dye-sensitized solar cells: how to take profit from solar energy with simple materials?", IJUP'09 - 2nd Meeting of Young Researchers at University of Porto, February 25-27, 2009.

Andrade, L., Zakeeruddin, S.M., Nazeeruddin, Md.K., Aguilar Ribeiro, H., Mendes, A., Graetzel, M., "Influence of different cations of N3 dyes on their photovoltaic performance and stability", Proc. of CHEMPOR'08, Braga, Portugal, September 4-6, 2008.

Gonçalves, V., Mendes, A. Machado, J., Oliveira, F., Nogueira, J., Aguilar Ribeiro, H., "Uso de polímeros condutores na protecção catódica em estruturas de aço", 5ªs Jornadas da Revista de Corrosão e Protecção de Materiais, Lisbon, Portugal, November 20, 2008.

Andrade, L., Aguilar Ribeiro, H., Sousa, J., Mendes, A., "Phenomenological Modeling of Dye-sensitized Solar Cells: a Transient Approach", Proceedings of the HOPV 09 Conference, Benidorm, Spain, 10-13 May, 2009.

Lopes, T., Andrade, L., Aguilar Ribeiro, H., Mendes, A., "Characterization of photoelectrochemical cells for water splitting by electrochemical impedance spectroscopy", HYCELTEC 09 - II Iberian Symposium on Hydrogen, Fuel Cells and Advanced Batteries, Vila Real, Portugal, September 13rd-17th, 2009).

Andrade, L., Cruz, R., Aguilar Ribeiro, H., Mendes, A., "Impedance characterization of DSCs: application on tandem systems for hydrogen production by water splitting", HYCELTEC 09 - II Iberian Symposium on Hydrogen, Fuel Cells and Advanced Batteries, Vila Real, Portugal, September 13rd-17th, 2009).

S. Magalhães, H. Aguilar Ribeiro, A. Mendes: "Third generation photovoltaic cells in the classroom", IJUP'10 - 3rd Meeting of Young Researchers at University of Porto, February 17-19, 2010.

#### **Patentes**

-Mendes, A. M. M., Mendes, J. G., Aguilar Ribeiro, H., Graetzel, M., Andrade, L., Gonçalves, L. and Costa, C. A., "Glass sealing of dye-sensitized solar cells", WO 2010/064213, 2010.

-Mendes, A. M. M., Mendes, J. G., Aguilar Ribeiro, H., Graetzel, M., Andrade, L., Gonçalves, L. and Costa, C. A., "Glass sealing of dye-sensitized solar cells", PCT/IB2009/055511, 2009.

-Mendes, A., Mendes, J., Aguilar Ribeiro, H., Grätzel, M., Andrade, L., Gonçalves, L.M., Costa, C.V., "Processo de selagem com vidro de células solares DSC", PT 104282, 2008.

#### **Outras publicações**

## 10. Communications in scientific meetings

### Outras comunicações orais

Andrade, L., Cruz, R., Aguilar Ribeiro, H., Mendes, A., "Impedance characterization of DSCs: application on tan-dem systems for hydrogen production by water splitting", HYCELTEC 09 - II Iberian Symposium on Hydrogen, Fuel Cells and Advanced Batteries, Vila Real, Portugal, September 13rd-17th, 2009).

T. Lopes, L. Andrade, H. Aguilar Ribeiro, A. Mendes, "Characterization of photoelectrochemical cells for water splitting by electrochemical impedance spectroscopy", HYCELTEC 09 - II Iberian Symposium on Hydrogen, Fuel Cells and Advanced Batteries, Vila Real, Portugal, September 13-17, 2009.

S. Magalhães, H. Aguilar Ribeiro, A. Mendes: "Third generation photovoltaic cells in the classroom", IJUP'10 - 3rd Meeting of Young Researchers at University of Porto, February 17-19, 2010.

R. Cruz, A. Tanaka, H. Aguilar Ribeiro, A. Mendes, "Carbon-based nanomaterials as counter electrodes for dye-sensitized solar cells", 2nd Nanotechnology for Sustainable Energy - ESF-FWF Conference, Obergurgl, Austria, July 4-9, 2010.

J.D. Costa, A. Apolinário, J. Azevedo, C.T. Sousa, J. Ventura, H.A. Ribeiro, A.M. Mendes, J.P. Araújo, "Growth control of TiO<sub>2</sub> nanotubes for dye-sensitized solar cell", IJUP 2011 (Young Research in Porto University), Porto, Portugal, February 2011.

J.D. Costa, A. Apolinário, J. Azevedo, C.T. Sousa, J. Ventura, H.A. Ribeiro, A.M. Mendes, J.P. Araújo, "Growth control of TiO<sub>2</sub> nanotubes for dye-sensitized solar cell", VI Jornadas do IFIMUP, Porto, Portugal, February 2011.

Apolinário, C.T. Sousa, J.D. Costa, J. Azevedo, J. Ventura, H.A. Ribeiro, A.M. Mendes, J. P. Araújo, "Thickness and order enhancement in arrays of TiO<sub>2</sub> nanotubes through a simple electropolishing pre-treatment", VI Jornadas do IFIMUP, Porto, Portugal, February 2011.

J. Azevedo, C.T. Sousa, J.D. Costa, A. Apolinário, J. Ventura, H. A. Ribeiro, A. M. Mendes, J. P. Araújo, "Synthesis of a  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> nanowires arrays by pulsed electrodeposition of Fe in alumina templates", EDNANO (8th International Workshop on Electrodeposited Nanostructures), Milan, Italy, March 2011.

J.D. Costa, A. Apolinário, J. Azevedo, C.T. Sousa, J. Ventura, H.A. Ribeiro, A.M. Mendes, J.P. Araújo, "Development of TiO<sub>2</sub> nanotube templates for applications in dye-sensitized solar cells", EDNANO (8th International Workshop on Electrodeposited Nanostructures), Milan, Italy, March 2011.

Aguilar Ribeiro, H., Costa, C., "A Rheological Model of the Paper Fiber Network in Impulse Drying: a Cellular Materials Approach", 2002 Progress in Paper Physics: A Seminar, SUNY-ESF, Finger Lakes, New York, 8-13 September 2002.

Aguilar Ribeiro, H., Sommeling, P.M., Kroon, J.M., Mendes, A. and Costa, C.A.V., "Dye-sensitized solar cells: novel concepts, materials and state-of-the-art performances.", IEEEES-3: The 3rd International Energy, Exergy and Environment Symposium, Évora, Portugal, 1-5 July 2007.

Gonçalves, V., Mendes, A. Machado, J., Oliveira, F., Nogueira, J., Aguilar Ribeiro, H., "Uso de polímeros condutores na protecção catódica em estruturas de aço", 5<sup>as</sup> Jornadas da Revista de Corrosão e Protecção de Materiais, Lisbon, Portugal, November 20, 2008.

Duarte, A.C., Aguilar Ribeiro, H., "Stability analysis of dye-sensitized solar cells by electrochemical impedance spectroscopy: influence of acid vs base peptization of nanocrystalline TiO<sub>2</sub> films", NANOSMAT-USA, International Conference on Surfaces, Coatings and Nanostructured Materials, Tampa, Florida, 27-30 March 2012.

### Comunicações em painel ("poster")

Duarte, A.C., Varela, A., Aguilar Ribeiro, H., "Dual-function SiO<sub>2</sub>/TiO<sub>2</sub> Semiconductors for Dye-sensitized Solar Cells", NANOSMAT-USA, International Conference on Surfaces, Coatings and Nanostructured Materials, Tampa, Florida, 27-30 March 2012.

Aguilar Ribeiro, H., Duarte, A.C., "Cellulose/titania nanostructured composites for electronic applications", IUFRO Division 5 Congress 2012, Lisbon, Portugal, 8-13 July 2012.

Andrade, L., Zakeeruddin, S.M., Nazeeruddin, Md.K., Aguilar Ribeiro, H., Mendes, A., Graetzel, M., "Influence of different cations of N3 dyes on their photovoltaic performance and stability", CHEMPOR'08, Braga, Portugal, September 4-6, 2008.

Lopes, T., Andrade, L., Aguilar Ribeiro, H., Mendes, A., "Characterization of photoelectrochemical cells for water splitting by electrochemical impedance spectroscopy", HYCELTEC 09 - II Iberian Symposium on Hydrogen, Fuel Cells and Advanced Batteries, Vila Real, Portugal, September 13rd-17th, 2009).

Aguilar Ribeiro, H., Bakker, N.J., Smit, H.J.P., Budel, T., Sommeling, P.M., Kroon, J.M., Mendes, A. and Costa, C.A.V., "Analysis of the stability of dye-sensitized solar cells by electrochemical impedance spectroscopy.", NanoSmat2007, Algarve, Portugal, 9-11 July 2007.

Paula Mendes, Mohamed Naceur Belgacem, Jacques Silvy, Helena Aguilar, João Ranita and Carlos A. V. Costa, "Effect of Impulse Drying on the Properties of Paper Made from Bleached Kraft Pulps of Eucalyptus globules", 2000 International Paper Physics, Progress in Paper Physics: A Seminar, Grenoble, France, 11-15 September 2000.

Aguilar, H.I.P.C., Nunes da Costa, Mário Rui P.F., Costa, Carlos A.V., "Application of TMA to the study of physical and rheological properties of paper webs", 7<sup>a</sup> Conferência Internacional de Engenharia Química, Lisboa, Portugal, 1998.

L. Andrade, H. Aguilar Ribeiro, J. Sousa, A. Mendes, "Phenomenological Modeling of Dye-sensitized Solar Cells: a Transient Approach", Proceedings of the HOPV 09 Conference, Benidorm, Spain, May 10-13, 2009.

S. Magalhães, H. Aguilar Ribeiro, A. Mendes, "Dye-sensitized solar cells: how to take profit from solar energy with simple materials?", IJUP'09 - 2nd Meeting of Young Researchers at University of Porto, February 25-27, 2009.

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#### 11: Languages

Language	Reading	Writing	Conversation
English	Very good	Very good	Good
French	Good	Basic	Basic
Portuguese	Very good	Very good	Very good