

# SMART COATINGS

ADVANCED COURSE

PROFESSOR R. ADVINCULA  
(Instructor)  
University of Houston,  
USA

LOCAL ADVISOR:  
Prof. Joao Delgado  
Porto University,  
Portugal  
[jdelgado@fe.up.pt](mailto:jdelgado@fe.up.pt)

30 JUNE - 01 JULY, 2011 (2 DAYS COURSE) / ALGARVE-PORTUGAL



IRONIX- CONTINUING EDUCATION  
[www.ironix-conferences.com](http://www.ironix-conferences.com)

# ABOUT THE COURSE

IRONIX- CONTINUING EDUCATION  
[www.ironix-conferences.com](http://www.ironix-conferences.com)

## COURSE OBJECTIVES:

The goal is to teach the state of the art and fundamentals in smart coatings based on stimuli-responsive coatings, nanostructured, and nanocomposite coatings.

This will start with a review of various methods of coatings fabrication, their unique properties, and immediately on current and potential applications. This includes self-cleaning coatings, sensing coatings, new conducting coatings, and nanocomposite barrier coatings.

A number of companies involved and university research will be highlighted.

At the end of the course, the participants will gain update of the state-of-the-art but also the fundamentals of fabrication and characterization of such coatings.

## WHO SHOULD ATTEND THE COURSE

Participants from both industry and academe will benefit for this course. This is geared towards researchers who are interested in innovation of new products and at the same time in learning some fundamentals about this coatings and materials. Ideal for up-to-date knowledge and survey of the emerging field.

## PRELIMINARY SUGGESTED READINGS:

1. Advincula, R. "Nanostructured Electrooptically Active Smart Coatings Based on Conjugated Polymer Networks: Precursor Polymer Approach, Devices, and Nanopatterning" *Smart Coatings II: ACS Symposium Series* **2009**, 1002, 158-177.
2. Advincula, R. "Nanostructured Conjugated Polymer Network Ultrathin Films and Coatings Using the Precursor Polymer Approach" *Nanotechnology Applications in Coatings: ACS Symposium Series*, **2009**, 1008, 51-61.
3. Advincula, R. "Nano Goes Green: Another Bright Idea" *Asia Pacific Coatings Journal*, March **2010**, 29-31.
4. Advincula, R. "A Recent Perspective on Nano and Smart Coatings" *Asia Pacific Coatings Journal*, October **2009**, 15-17.
5. Advincula, R. "Green Polyelectrolyte Ultra-Thin NanoCoatings" *Asia Pacific Coatings Journal*, February **2009**, 12-14.
6. Advincula, R. "Nanostructured Polymer Coatings" *European Coatings Journal* **2008**, December Issue.
7. Advincula, R. "Nanostructured conjugated polymer network ultrathin film using the precursor polymer approach" *JCT Coatings tech* **2008**, 5, 34-37.
8. Advincula, R.\* "Polymer Brushes by Anionic and Cationic Surface-Initiated Polymerization (SIP)" *Advances in Polymer Science* **2006**, 197, 107-136.
9. *Polymer Brushes*: Advincula, R.; Ruehe, J.; Brittain, W.; Caster, K. Eds. VCH-Wiley: Weinheim, 2004, pp. 1-483.

## COURSE CONTENTS:

- Polymer and Coatings Basics
- Nanostructured Materials and Thin Films
- Stimuli-responsive Coatings
- Characterization of Coatings
- Applications and Beyond



## About

### **PROFESSOR RIGOBERTO C. ADVINCULA**

*Department of Chemistry and*

*Department of Chemical Engineering*

*University of Houston, Houston, Texas 77204*

*USA*

[www.nanostructure.uh.edu](http://www.nanostructure.uh.edu)

**RESEARCH area:** Design, synthesis, and characterization of polymers and nanostructured materials capable of controlled-assembly, tethering, and self-organization in ultrathin films.

This includes functional macromolecules, coordination polymerization, polymerization on surfaces, electropolymerization, and preparation of nanoparticles and hybrid materials.

Properties include: smart coatings, electrically conducting, photoluminescent, electroluminescent, energy harvesting, optically active, and biocompatible.

Surface sensitive spectroscopy and microscopy is systematically utilized to probe materials properties and biological phenomena.

... also involved in investigating nanoparticles, nanostructured surfaces, and nanocomposite materials for sensor and bioapplications.

Other applied studies include packaging, coatings, biomaterials, plastics, and process development.

### **INDUSTRIAL EXPERIENCE:**

- Consultant, *PPG Industries, Rhodia, Dow Corning, Exxon Mobil, Avery-Dennison Inc., Nalco Energy Services, Nanotex Inc., Roche Diagnostics, Zeon Nippon, Fuji Films, Lintec Inc., Agilent Technologies, INMAT Technologies, Dai Nippon Printing, Chemrez Technologies, San Miguel Corporation, Kuraray America.*

- Short and long-term industrial projects, analysis, development, collaborative proposals, litigation, and tutorials.

**RECENT PUBLICATIONS:**

Total Publications Lifetime: 319 and 9 Patents

1. Park, J.; Ponnampati, R.; Taranekar, P.; Advincula, R. "Carbazole Peripheral Poly(benzyl ether) Dendrimers at the Air–Water Interface: Electrochemical Cross-Linking and Electronanopatterning" *Langmuir* **2010**, *26*(9), **6167–6176**.
2. Reznik, C.; Estillore, N.; Advincula, R.\*; Landes, C.\* "Single Molecule Spectroscopy Reveals Heterogeneous Transport Mechanisms for Molecular Ions in a Polyelectrolyte Polymer Brush" *J. Phys. Chem. B* **2009**, *113* (44), **14611–14618**.
3. Park, J.; Liu, M.; Mays, J.; Dadmun, M.; Advincula, R.\* "Nano-donuts from pH-dependent block restructuring in amphiphilic ABA triblock copolymer vesicles at the air-water interface" *Soft Matter* **2009**, *5*, **747**
4. Duran, H.; Ogura, K.; Nakao, K.; Vianna, S.; Usui, H.\*; Advincula, R.\*; Knoll, W.\* "High-Vacuum Vapor Deposition and in Situ Monitoring of N-Carboxy Anhydride Benzyl Glutamate Polymerization" *Langmuir* **2009**, *25* (18), **10711–10718**.
5. Fujie, T.; Park, J.; Murata, A.; Estillore, N.; Tria, M.C.; Takeoaka, S.\*; Advincula, R.\* "Hydrodynamic Transformation of a Freestanding Polymer Nanosheet Induced by a Thermoresponsive Surface" *ACS Appl. Mater. Interfaces* **2009**, *1* (7), **1404–1413**.
6. Wang, W.; Zhang, S.; Chingwangso, P.; Advincula, R.; Lee, T.R.\* "Electric Potential Stability and Ionic Permeability of SAMs on Gold Derived from Bidentate and Tridentate Chelating Alkanethiols" *J. Phys. Chem. C* **2009**, *113* (9), **3717–3725**.
7. Obeida, R.; Park, J.; Advincula, R.; Winnik, F.\* "Temperature-dependent interfacial properties of hydrophobically end-modified poly(2-isopropyl-2-oxazoline)s assemblies at the air/water interface and on solid substrates" *J. Coll. and Interface Sci.* **2009**, *340*, *2*, **142-152**.
8. Park, M.; Sakellariou, G.; Pispas, S.; Hadjichristidis, N.; Advincula, R.\* "On the quantitative adsorption behavior of multi-zwitterionic end-functionalized polymers onto gold surfaces" *Coll. and Surf. A: Phys. and Eng. Aspects*, **2008**, *326* (3), **115-121**.

9. Fulghum, T. M.; Taranekar, P.; Advincula, R.\* "Grafting Hole-Transport Precursor Polymer Brushes on ITO Electrodes: Surface-Initiated Polymerization and Conjugated Polymer Network Formation of PVK" *Macromolecules*, **2008, 41, 5681–5687**.
10. Reznik, C.; Darugar, Q.; Wheat, A.; Fulghum, T.; Advincula, R.; Landes, C.\* "Single Ion Diffusive Transport within a Poly(styrene sulfonate) Polymer Brush Matrix Probed by Fluorescence Correlation Spectroscopy" *J. Phys. Chem. B*, **2008, 112, 10890–10897**.
11. Park, J.; Koenen, N.; Forster, M.; Ponnampati, R.; Scherf, U.\*; and Advincula, R.\* "Interplay of Vesicle and Lamellae Formation in an Amphiphilic Polyfluorene-b-polythiophene All-Conjugated Diblock Copolymer at the Air–Water Interface" *Macromolecules*, **2008, 41, 6169–6175**.
12. Kaewtong, C.; Jiang, G.; Felipe, J.; Pulpoka, B.\* and Advincula, R.\* "Self-Assembly and Electrochemical Oxidation of Polyamidoamine–Carbazole Dendron Surfmer Complexes: Nanoring Formation" *ACS Nano*, **2008, 2, 1533–1542**.
13. Patton, D.; Fulghum, T. M.; Taranekar, P.; Advincula, R.\* "Electrochemically Active Dendritic–Linear Block Copolymers via RAFT Polymerization: Synthesis, Characterization, and Electrodeposition Properties" *Macromolecules*, **2008, 41, 6703–6713**
14. Bang, G.; Chang, H.; Koo, J.; Lee, T.; Advincula, R.; Lee, H. "High-fidelity Formation of a Molecular-junction Device Using a Thickness-controlled Bilayer Architecture" *SMALL* **2008, 4, 1399-1405**.
15. Park, Y.; Taranekar, P.; Park, J-Y.; Fulghum, T. M.; Baba, A.; Ponnampati, R.; Advincula, R.\* "Hybrid CdSe Nanoparticle-Carbazole Dendron Boxes: Electropolymerization and Energy-Transfer Mechanism Shift" *Adv. Funct. Mater.* **2008, 18, 2071-2078**.

# COURSE VENUE

IRONIX- CONTINUING EDUCATION  
[www.ironix-conferences.com](http://www.ironix-conferences.com)

**Hilton Vilamoura As Cascatas Golf Resort & Spa**  
Rua da Torre d'Agua, Lote 4.11.1B  
8125-615 Vilamoura  
Quarteira, Algarve  
Portugal



*Special Rates for course participants!  
Contact us!*

# REGISTRATION

IRONIX- CONTINUING EDUCATION  
[www.ironix-conferences.com](http://www.ironix-conferences.com)

REGISTRATION FEE: 680, EUR \*

**(\*) Registration includes:**

- ✓ 2 full days course,
- ✓ Printed Course Materials, in book format
- ✓ Course Certificate,
- ✓ 2 refreshments daily,
- ✓ Lunch at Hotel Venue (daily / 2 days)

**REGISTRATION FEE:**

**Early registration = 680, EUR \* (till 15 March, 2011)**  
**After= 980 EUR \***

**CONTACT:**

Dr. Meire Gomes

[meire.gomes@ironix-conferences.com](mailto:meire.gomes@ironix-conferences.com)

IRONIX-CONTINUING EDUCATION

[www.ironix-conferences.com](http://www.ironix-conferences.com)

[info@ironix-conferences.com](mailto:info@ironix-conferences.com)

**LOCAL ADVISOR:**

Prof. Joao Delgado

LFC – Laboratório de Física das  
Construções,

Departamento de Engenharia Civil,  
Universidade do Porto,  
Portugal

[jdelgado@fe.up.pt](mailto:jdelgado@fe.up.pt)

**NOTE: this course is limited to a small number of participants, reserve your place soon!**

**IRONIX - CONTINUING EDUCATION:**

**SMART COATINGS**

30 JUNE - 01 JULY, 2011 / ALGARVE-PORTUGAL

.....  
**Please print or type all information on this form and send us back by Fax or e-mail: FAX: ++00 351 234 410 097**

**E-mail: [registration@ironix-conferences.com](mailto:registration@ironix-conferences.com)**

**REGISTRATION FORM**

Prof.  Dr.  Mr.  Ms.

Your Full Name

E-mail

Department

Institution / Company Name

Mailing Address

City

Zip / Postal Code

Country

**Early registration = 680, EUR \* (till 15 March, 2011)**

**After= 980, EURO\***

**PAYMENT CAN BE DONE BY BANK TRANSFER or BY CREDIT CARD:**

**Bank Transfer:**

*(Please attach a copy of the receipt of remittance to this form)*

**Bank Holder:** IRONIX-GLOBAL EVENTS CONSULTING Unip. Lda

**BANK:** BPN - Banco Portugues de Negocios

**Bank Address:** Murtosa, Aveiro - Portugal

**Swift Code / BIC:** BPNPPTPL

**IBAN:** PT50 0079 0000 2608 3772 1019 7

**NIB:** (Only for transfer inside of Portugal) 007900002608377210197

**Credit Card:**

( ) VISA ( ) MASTER

**Credit Card Number:** \_\_\_\_\_

**Expiration Date (Month/Year):** \_\_\_\_\_

**Signature / Date (AUTHORIZATION)**

(\*) Registration cancellations must be received by March 30, 2011 for a Refund and note that a 100 EURO administrative fee is not refundable. Please note that refunds will be done after the EVENT for administrative reasons.