

CURRICULUM VITAE

of Mirtat S. BOUROUSHIAN

STUDIES – ACADEMIC CAREER

- 2006 – Assistant Professor in the School of Chemical Engineering, NTUA, majoring in “*Solid State chemistry*”
- 2001–2006 Lecturer in the School of Chemical Engineering, NTUA.
- 1998 Ph.D. in Chemical Engineering. National Technical University of Athens (NTUA)
- 1991 Diploma in Chemical Engineering, NTUA

Dissertations

- “*Electrolytic preparation of Cd-Se-Te semiconductors*”. **PhD Thesis**. Laboratory of General Chemistry, Section of Chemical Sciences, School of Chemical Engineering, NTUA (1998), 297 p. (in greek).
- “*Recycling of paper. Study of acidic treatment*”. **Diploma Thesis**. Laboratory of Organic Chemical Technology, Section of Synthesis and Development of Industrial Processes, School of Chemical Engineering, NTUA (1991), 129 p. (in greek).

Under-graduate courses

- 2002 – *Solid State Chemistry* – course in the School of Applied Mathematics and Physics (AMP), conducted at the 6th semester (7th from 2009).
- 1992 – Teaching assistance in students’ Laboratory Training for the Electrical and Computer Engineering (ECE), Mining and Metallurgical Engineering (MME), and Applied Mathematics and Physics Schools of NTUA. In detail:
- (1992-96) *Chemistry* (1st semester ECE), *General Chemistry II* (2nd semester MME)
- (2000-01) *General Chemistry* (1st semester MME)
- (2001 –) *General Chemistry* (5th semester AMP)

Post-graduate courses

- 2004– “*Solid State Physics and Chemistry*”, 1st semester, and
- 1998-2000 (i) “*Solid State Chemistry*”, 1st semester, (ii) “*Semiconductors*”, 2nd semester (Interdepartmental Post-graduate Divisions of NTUA, Division of Material Science and Technology).
- 2001– “*Topics in Chemical Technology*”, 1st semester (Studies in Didactics of Chemistry and New Educational Technologies; Inter-University post-graduate program of NTUA and National Capodistrian University of Athens).

Seminar lectures

- “*Electrodeposition of CdSe and Cd(Se,Te) thin films from near-boiling aqueous-ethylenglycol solutions*”, Lecture for the Project “New Materials” in the frame of the 11th Seminar of the “Ecological Surface Finishing” (TEMPUS) NTUA, Athens (May 8-9, 1998).
- “*Electrodeposition of Semiconductors*” Micro and Nano Deposition (MINDE) Training Courses: ATC 3 “*Micro and Nano Scale Patterned Deposition*”, NTUA, Athens (Oct. 14-19, 2007).

Professional Memberships

Technical Chamber of Greece

Hellenic Association of Chemical Engineers

International Society of Electrochemistry

AUTHORSHIP

Monograph

M. Bouroushian: “Electrochemistry of Metal Chalcogenides”. Series: *Monographs in Electrochemistry* (Ed. F. Scholz), Springer-Verlag Berlin Heidelberg 2010, 358 p.

Textbooks

- M. Bouroushian: “*Solid State Chemistry*”, NTUA (Ed.) Athens (2005) 415 p. in Greek.
- M. Bouroushian, D. Vasilakopoulos & N. Spyrellis: “*General Chemistry*”. Textbook for the Public School, edited for the 1st Cycle of Technical Lyceum, Ministry of National Education of Greece (1999) 254 p. in Greek.

RESEARCH WORK

Electrochemistry of materials and crystal growth; namely, investigation of soft (electro)chemical methods intended to the controlled preparation and characterization of specific material microstructures, as well as the manufacture of heterostructures (metal-semiconductor, semiconductor-semiconductor, semiconductor-liquid junctions) featuring adjusted properties for technological applications. In particular:

- Synthesis of binary and ternary selenide and telluride compounds by electrochemical (constant and pulse current) deposition, chemical deposition, or hybrid techniques. The produced films in single and multiple layer configurations are evaluated as photovoltaic device components and also as electrodes in photoelectrochemical cell and photocatalytic applications.
- Electrochemical anodization of metals; production of porous oxides and investigation of optical sensitization effects in photoelectrochemical cells.
- Formation of simple and composite (polymer-reinforced) metallic coatings using constant and pulse current electrolytic techniques, and characterization of their microstructure in connection with mechanical properties and corrosion behavior. Theoretical and experimental study of the nucleation and crystal growth process.

Characterization and measuring techniques used in my research work include:

- Electrochemical methods, such as (photo)voltammetry, chronoamperometry, photocurrent spectroscopy, and electrochemical impedance spectroscopy (EIS).
- Solid state characterization: X-ray powder diffractometry (XRD), optical microscopy, Scanning Electron Microscopy (SEM), Energy Dispersive X-ray Analysis (EDAX), micro-Raman and X-ray Fluorescence (XRF) spectrometry.
- Optical methods: absorption/reflection spectroscopy of thin films, modulation spectroscopy, UV-Vis and Atomic Absorption Spectrometry (AAS).
- Evaluation of semiconductor diode characteristics, Hall effect and surface conductivity measurements.

My research work includes the following original publications in scientific journals and conference proceedings (and presentations):

Refereed Journal Articles

1. M. Bouroushian, Z. Loizos, N. Spyrellis and G. Maurin: "Influence of heat treatment on structure and properties of electrodeposited CdSe or Cd(Se,Te) semiconducting coatings" *Thin Solid Films* 229 (1993) 101-106.
2. M. Bouroushian, C. Kollia, Z. Loizos, N. Spyrellis and G. Maurin: "Substrate Effect on the structure and properties of electrodeposited CdSe and Cd(Se,Te) coatings" *Appl. Surf. Sci.* 102 (1996) 112-119.

3. M. Bouroushian, Z. Loizos, N. Spyrellis and G. Maurin: "Hexagonal cadmium chalcogenide thin films prepared by electrodeposition from near-boiling aqueous solutions" *Appl. Surf. Sci.* 115 (1997) 103-110.
4. M. Bouroushian, Z. Loizos and N. Spyrellis: "Electrochemical behavior of Ti, Ni and SnO₂/glass electrodes, used for the electrodeposition of cadmium chalcogenide semiconductors, in acid aqueous electrolytes" *J. Mater. Sci. Lett.* 18 (1999) 1189-1192.
5. M. Bouroushian, Z. Loizos and N. Spyrellis: "Electrocrystallization of CdSe upon various substrates. Structural arrangement and photoelectrochemical performance" *Appl. Surf. Sci.* 156 (2000) 125-134.
6. M. Bouroushian, T. Kosanovic, Z. Loizos and N. Spyrellis: "On a thermodynamic description of Se(IV) electroreduction and CdSe electrolytic formation on Ni, Ti and Pt cathodes in acidic aqueous solution" *Electrochem. Commun.* 2 (2000) 281-285.
7. M. Bouroushian, J. Charoud-Got, Z. Loizos and N. Spyrellis: "A phase modification of CdSe electrodeposits induced by substrate roughness" *J. Mater. Sci. Lett.* 19 (2000) 2201-2203.
8. M. Bouroushian, J. Charoud-Got, Z. Loizos and N. Spyrellis: "Structure and properties of CdSe and CdSe_xTe_{1-x} electrolytic coatings on Ni and Ti cathodes. Influence of the acidic aqueous bath pH" *Thin Solid Films* 381 (2001) 39-47.
9. D. Vasilakopoulos, M. Bouroushian and N. Spyrellis: "Texture and morphology of zinc electrodeposited from an acid sulfate bath" *T. I. Met. Finish.* 79(3) (2001) 107-111.
10. M. Bouroushian, T. Kosanovic, Z. Loizos and N. Spyrellis: "Electrochemical formation of ZnSe from acidic aqueous solutions" *J. Solid State Electrochem.* 6/4 (2002) 272-278.
11. M. Bouroushian, T. Kosanovic and N. Spyrellis: "Aspects of ZnSe electrosynthesis from selenite and selenosulfite aqueous solutions" *J. Solid State Electrochem.* 9 (2005) 55-60.
12. T. Kosanovic, M. Bouroushian and N. Spyrellis: "Soft growth of the ZnSe compound from alkaline selenosulfite solutions" *Mater. Chem. Phys.* 90 (2005) 148-154.
13. M. Bouroushian and T. Kosanovic: "Photoelectrochemical measurements on cathodically electrodeposited films of cadmium and zinc selenide compounds" *Mater. Sci. Forum* 480-481 (2005) 1-12.
14. M. Bouroushian, T. Kosanovic and N. Spyrellis: "Oriented [111] ZnSe electrodeposits grown on polycrystalline CdSe substrates" *J. Cryst. Growth* 277 (2005) 335-344.
15. M. Bouroushian, T. Kosanovic, H.Y. Xu and D. Papadimitriou: "Structural and optical investigation of electrosynthesized Zn_xCd_{1-x}Se thin films" *J. Phys. D: Appl. Phys.* 38 (2005) 1540-1545.
16. M. Bouroushian and T. Kosanovic: "Electrochemical formation and composition analysis of Zn_xCd_{1-x}Se solid solutions" *J. Solid State Electrochem.* 10 (2006) 223-229.

17. D. Vasilakopoulos, M. Bouroushian and N. Spyrellis: "Texture and Morphology of Pulse Plated Zinc Electrodeposits" *J. Mater. Sci.* 41/10 (2006) 2869-2875.
18. M. Bouroushian, T. Kosanovic and N. Spyrellis: "A pulse plating method for the electrosynthesis of ZnSe" *J. Appl. Electrochem.* 36(7) (2006) 821-826.
19. M. Bouroushian, D. Karoussos and T. Kosanovic: "Photoelectrochemical properties of electrodeposited CdSe and CdSe/ZnSe thin films in sulphide-polysulphide and ferro-ferricyanide redox systems" *Solid State Ionics* 177 (2006) 1855–1859.
20. M. Bouroushian, T. Kosanovic, D. Karoussos, N. Spyrellis: "Electrodeposition of polycrystalline ZnTe from simple and citrate-complexed acidic aqueous solutions" *Electrochim Acta* 54 (2009) 2522-2528.
21. D. Vasilakopoulos, M. Bouroushian, N. Spyrellis: "Electrocrystallisation of zinc from acidic sulphate baths; A nucleation and crystal growth process" *Electrochim Acta* 54 (2009) 2509-2514.
22. T. Kosanovic, D. Karoussos, M. Bouroushian: "CdSe electrodeposition on anodic, barrier or porous Ti oxides. A sensitization effect" *J Solid State Electrochem.* 14 (2010) 241-248.
23. D. Vasilakopoulos, M. Bouroushian: "Electrochemical codeposition of PMMA particles with zinc" *Surf. Coat. Techn.* 205 (2010) 110–117

Selected Conferences

1. M. Bouroushian, Z. Loizos, N. Spyrellis and G. Maurin: "Semiconducting performance of CdSe and Cd(Se,Te) electrodeposited coatings", Proc., 13th Yugoslav Symposium (with international participation) on *Electrochemistry*; Serbian Chemical Society (June 11-15, 1995) 53-55.
2. M. Bouroushian, C. Kollia, Z. Loizos, N. Spyrellis and G. Maurin: "Substrate Effect on the nucleation and properties of electrodeposited CdSe and Cd(Se,Te) coatings", Proc. Int. Symposium on "*Si Heterostructures. From Physics to Devices*", Heraclion, Crete (Sep 11-14, 1995).
3. M. Bouroushian, Z. Loizos, A. Mitsis, N. Spyrellis and G. Maurin: "Hexagonal cadmium chalcogenide thin films prepared by electrodeposition from boiling aqueous solutions", *ibid.*
4. M. Bouroushian, Z. Loizos, N. Spyrellis and G. Maurin: "Preparation of polycrystalline CdSe & CdSe_xTe_{1-x} thin films for solar energy conversion", Proc. Int. Conf. on "*Application Of Critical Technologies For The Need Of Society*"; Armenian Institutions and the National Technical University of Athens, Yerevan, Armenia (Sep. 14-17, 1995).
5. M. Bouroushian, Z. Loizos, A. Mitsis and N. Spyrellis: "Electrodeposition of CdSe and Cd(Se,Te) thin films from near-boiling aqueous – ethylenglycol solutions", Proc., 14th

Yugoslav Symposium on *Electrochemistry* (with international participation); Serbian Chemical Society (June 15-18, 1998) 175-184.

6. D. Vasilakopoulos, M. Bouroushian, J. Charoud-Got and N. Spyrellis: "Structure and properties of Zinc electrodeposits prepared under pulse plating conditions", *Annual ISE Meeting 2000*, Warsaw, Poland (Sep. 3-8, 2000) – Proc. in CD-ROM.

7. T. Kosanovic, J. Charoud-Got and M. Bouroushian: "Electrodeposition of ZnSe thin films from acidic, aqueous solutions", *ibid.*

7. S. Psarrou, D. Vasilakopoulos, M. Bouroushian, C. Kollia and N. Spyrellis: "Nickel matrix and Zinc matrix composite electrocoatings containing polymeric microparticles", *15th World Interfinish Congress and Exhibition*, Garmisch - Partenkirchen, Germany (Sep. 13-15, 2000) Book of Abstracts, p.160.

8. D. Vasilakopoulos, M. Bouroushian and N. Spyrellis: "Zinc composite electrocoatings containing polymeric particles", Proc. Int. Conf. on "*Electrochemistry and Surface Technology*", Moscow, Russia (June 4-8, 2001) 122.

9. T. Kosanovic, J. Charoud-Got, M. Bouroushian, Z. Loizos and N. Spyrellis: "Electrochemical growth of ZnSe", *ibid.* 155.

10. M. Bouroushian, J. Charoud-Got, T. Kosanovic, Z. Loizos and N. Spyrellis: "Structural and optical properties characterization of CdSe semiconductor electrodeposits", Proc. Int. Conf. on "*Instrumental Methods of Analysis. Modern Trends and Applications*", Ioannina, Greece (Sep. 5-8, 2001) 229.

11. D. Vasilakopoulos, M. Bouroushian and N. Spyrellis: "XRD analysis of zinc electrodeposited from acidic sulfate solutions", *ibid.* 231.

12. M. Bouroushian and N. Spyrellis: "Electrodeposition of II-VI semiconductor compounds", *East-Forum 2001 "Electrodeposition in Electronics"*, Chalkidiki – Uranoupolis, Greece (Oct. 10-13, 2001) Book of Abstracts, p.16.

13. M. Bouroushian, T. Kosanovic and N. Spyrellis: "Photoelectrochemical measurements on cathodically electrodeposited films of cadmium and zinc selenide compounds", 1st Int. Meeting on *Applied Physics (APHYS-2003)*, Badajoz, Spain (Oct. 13-18, 2003), Book of Abstracts p. 599.

14. E. Voulgari, M. Bouroushian, I. Palivos and N. Spyrellis: "Text and multimedia; readability in digital applications", 2nd Int. Conf. on *Typography and Visual Communication*, Thessaloniki, Greece (June 24-29, 2004).

15. M. Bouroushian and T. Kosanovic: "Electrochemical formation and properties of Zn_xCd_{1-x}Se solid solutions", Proc. 6th Int. Conf.: *VI. Solid State Chemistry*, Prague, Czech Republic (Sep. 13-17, 2004) 225.

16. D. Karoussos, T. Kosanovic, M. Bouroushian, Z. Loizos and N. Spyrellis: "Photoaction spectra of cathodically electro-deposited cadmium and zinc chalcogenides employing various

red-ox solutions”, Proc. 55th ISE Annual Meeting: «*Electrochemistry: From Nanostructures to Power Plants*», Thessaloniki, Greece (Sep.19-24, 2004) 525.

17. D. Vasilakopoulos, M. Bouroushian and N. Spyrellis: “On the galvanostatic electrodeposition and nucleation of zinc”, *ibid.* 490.

18. T. Kosanovic, D. Karoussos, M. Bouroushian and N. Spyrellis: “Electrodeposition and properties of $Zn_xCd_{1-x}Se$ thin films”, *East-Forum 2005, EUROINTERFINISH*, Barcelona, Spain (May 12-13, 2005), p. 44.

19. M. Bouroushian, D. Karoussos and T. Kosanovic: “Optical properties of electrodeposited $ZnSe/CdSe/Ni$ and $Zn_xCd_{1-x}Se/Ti$ films”, SSI-15: Int. Conf. on *Solid State Ionics*, Baden-Baden, Germany (Jul. 17 – 22, 2005) Book of Abstracts, P292.

20. D. Karoussos, T. Kosanovic and M. Bouroushian: “Optical and electrical properties of electrodeposited $CdSe$ thin films as a function of microstructure”, 4th International Workshop on Electrodeposited Nanostructures (EDNANO), Dresden, Germany (Mar. 16 – 18, 2006).

21. T. Kosanovic, D. Karoussos, M. Bouroushian, N. Spyrellis: “The crystallite size effect in electrodeposited $CdSe$ thin films (Microstructural relations in the $CdSe/TiO_x$ system), East-Forum 2006, “Control of deposit processes”, Schwäbisch Gmünd (June 1-2, 2006).

22. M. Bouroushian, D. Karoussos and T. Kosanovic: “Binary $ZnSe/CdSe$ and $ZnTe/CdSe$ polycrystalline films as electrodes in photoelectrochemistry”, 16th International Conference on Photochemical Conversion and Storage of Solar Energy, Uppsala, Sweden (Jul. 2-7, 2006) Book of Abstracts, W7-P-9.

23. T. Kosanovic, D. Karoussos, D. Vasilakopoulos and M. Bouroushian: “A study on Cd and Zn selenides electrodeposited on variously treated Ti substrates”, *ibid.* W7-P-10.

24. M. Bouroushian and T. Kosanovic: “Electrocrystallization of $ZnSe$ on porous titanium oxide”, 57th Annual Meeting of the *International Society of Electrochemistry: “Innovative Electrochemistry, Enterprising Science”*, Heriot-Watt University, Edinburgh, UK (Aug. 27 – Sep. 1, 2006) Book of Abstracts, S5 P-22.

25. D. Vasilakopoulos, M. Bouroushian and N. Spyrellis: “Electrochemical codeposition of PMMA particles with zinc”, *ibid.* S5 P-113.

26. D. Karoussos, M. Bouroushian: “On the ferro-ferricyanide photocorrosion effect on $CdSe(ZnSe)$ electrodes”, Inorganic Reactions Mechanisms Subject Group Meeting, University of York, UK (18th – 20th March 2007), Book of Abstracts, P-24.

27. T. Kosanovic, D. Karoussos and M. Bouroushian: “Electrodeposition of Zinc Telluride”, 17th International Symposium on the Photochemistry and Photophysics of Coordination Compounds (ISPPCC), Trinity College, Dublin (24 - 28 June 2007), Book of Abstracts, P-9.

28. D. Karoussos, T. Kosanovic, D. Vasilakopoulos and M. Bouroushian: “Hexacyanoferrates and II-VI compound photoelectrochemistry”, *ibid.* P-10.

29. T. Kosanovic, D. Karoussos, M. Bouroushian & N. Spyrellis: “Electrodeposition of polycrystalline ZnTe in aqueous medium using constant and pulsed potentials”, International Conference EUROINTERFINISH 2007 on *Nanotechnology and Innovative Coatings*, Athens, Greece (18-19 Oct. 2007) CD-ROM O-26.
30. D. Vasilakopoulos, M. Bouroushian, N. Spyrellis: “Electrocrystallization of Zinc from Acidic Baths; A Nucleation and Crystal Growth Process”, *ibid.* O-27.
31. M. Bouroushian, D. Karoussos, T. Kosanovic: “Sensitization of porous Titania electrodes by CdSe electrodeposition”, 5th Kurt Schwabe Symposium 2009: Corrosion, Semiconductors, Solar Cells, Erlangen, Germany (24–28 May 2009)- abstracts in CD-ROM.
32. R. Koutsikou, M. Bouroushian: “Photoelectrochemical Characterization of Polycrystalline CdSe, CdTe, and CuInSe₂ Semiconductor Films”, Proc. 7th Balkan Physical Union (BPU) General Conference, Alexandroupolis, Greece (9-13 Sept 2009) pp. 961-966.
33. R. Koutsikou, D. Vasilakopoulos, M. Bouroushian: “Stoichiometric CuInSe₂ electrodeposited films”, 2nd Regional Symposium on Electrochemistry: South-East Europe, Belgrade, Serbia (June 6 to 10, 2010) SDE-P-14.
34. D. Karoussos, R. Koutsikou, M. Bouroushian: “Optical properties of templated CdSe electrodeposits on nanoporous TiO₂”, *ibid* FSP-P-05.

Reviewer for international scientific journals

Chemical Physics Letters, Thin Solid Films, Electrochimica Acta, Ionics (Springer) J. Materials Science, Materials Chemistry and Physics, J. Solid State Electrochemistry, Materials Research Bulletin, Applied Surface Science, Optical Materials, Solid State Sciences, Materials Science in Semiconductor Processing, Materials Science and Engineering B.

PROJECTS

Coordinated the following:

- “*ARIADNI: Electronic Course Pack: “Solid State Chemistry”*”, CSF III, EPEAEK II (03/2004 - 03/2005).
- “*Thermodynamics and charge transfer kinetics at semiconductor/electrolyte interfaces and heterostructures of microcrystalline semiconductors. A study of II-VI compounds’ single and double layer photoelectrodes*”, NTUA, Basic Research Program “Leucippus” (1/1/2006-31/12/2007).

Past Projects (selected)

“*Upgrading of the Undergraduate Curriculum of the three Chemical Engineering Depts. of Greece*” EPEAEK 1 program, Measure 3.1.α (1/1/1997-30/6/2000).

“*Improvement of the adhesive and corrosion resistance properties of unpainted and painted electrogalvanized steels*”, POLYMET” Brite EuRam III (BRPR - CT97 - 550) (1/3/1998 – 31/8/2001).

“*Development of laboratories network for the integrated control of environment quality*”, EPET II, Sub-project 3.1, National Secretariat of Research & Development (19/10/1999 – 19/10/2001).

“*Leucippus: Educational Chemistry software for the High School*”, EPEAEK, Measure 1.1.a, Pedagogical Institute, National Ministry of Development (2000-2001).

“*Production of Tutorial Multimedia for novel technologies and management systems. Environment – Energy - Safety*”, INTERREG, National Ministry of Economics, (1/4/2001 – 30/6/2001).

“*Plated copper interconnected systems for advanced microelectronics*”, INTAS Belarus-97-880, (1/1/1999 – 31/1/2001).

“*Development of software simulating the consequences of using chemical weapons*”, National Ministry of Defense (2001-2002).

“*Development of an integrated alternative system for the environmentally compatible management of spent batteries and accumulators*”, General Secretariat of Research & Technology, CSF III – OPC, Axis 4, Measure 4.5: Natural Environment and Sustainable Development (2003-2006).

Consultancy Activities

“*Study on the suitability of Polyethylene Pipes for drinking water supply*” Technical report (N. Spyrellis, A. Haloulakou, M. Bouroushian & I. Mavroidis; Athens, 1999, 100 p.) prepared for the National Company of Water Supply and Sewerage.