

Curriculum Vitae: ELEFThERIOS J. KAPETANAKIS

September 2010

1. Personal Information

Last Name: Kapetanakis.
First Name: Eleftherios.
Father's Name: John.
Birth Place: Athens, Greece.
Birth Date: 22 March 1969.
Family Status: Married.
Military duties: Air force, commissioned officer, 1994-1996.
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2. Education

5/05: PhD in Physics, National Technical University of Athens (NTUA),
School of Applied Mathematics and Physics.
7/94: MSc (by dissertation) in Physics, University of Essex, School of
Engineering, Department of Physics, UK.
4/92: Certificate of studies in Physics, University of Crete, School of
Sciences and Engineering, Department of Physics.
Languages: Oral and written fluency in Greek, (mother tongue) almost complete
oral and written fluency in English.

3. Research Experience

1/4/96-30/9/00: **Research assistant** in the Institute of Microelectronics (IMEL),
National Center for Scientific Research (NCSR) DEMOKRITOS, under a scholarship
awarded from NCSR DEMOKRITOS, Athens, Greece.

1/4/97-31/3/98: **Research assistant in** EU funded Research & Development project FASEM (Fabrication and Architecture of Single Electron Memory), of the Institute of Microelectronics, NCSR DEMOKRITOS, Athens, Greece.

1/3/01-31/1/04: **Member of the Principal Research Group, as research assistant and associate researcher** during all phases of the EU funded Research & Development project "NEON" (Nanoparticles for Electronic ApplicatiON), of the Institute of Microelectronics, NCSR DEMOKRITOS, Athens, Greece.

1/9/05-31/8/07: **Visiting Assistant Professor (P.D. 407/80)**, Department of Telecommunications Science and Technology, University of Peloponnese, Greece.

22/12/06-9/1/08: **Post-doctoral Scientist** in nanostructures and nanoelectronic devices reserch programe, Institute of Microelectronics NCSR DEMOKRITOS, Athens, Greece.

10/1/08-today: **Collaborating researcher** with the Institute of Microelectronics NCSR DEMOKRITOS, Athens, Greece.

10/1/08-today: **Assistant Professor in "Digital Electronics"**, Electronics Department, Technological Educational Institute of Crete - Branch of Chania, Greece.

3. Teaching Experience

- **Lecturer**, Teaching undergraduate classes on the courses, "*Electronics*", "*Digital Electronics*", "*Physics of Electronic Devices*", Technological Educational Institute of Piraeus, Department of Electronics and Department of Electronic-Computer Systems, **2002-2008**.
- **Course Leader**, Teaching undergraduate classes on the courses "*Logic Circuits Design*", "*Computer Architecture*", "*VLSI Circuit Design*", University of Peloponnese, Department of Telecommunications Science and Technology, **2005-2007**.
- **Assistant Professor** Teaching undergraduate classes on the courses "*Digital Circuits Design*", "*Electronic Components*", "*Microelectronics & VLSI Design*", Electronics Department, Technological Educational Institute of Crete - Branch of Chania, Greece. **2008-today**

4. Research Areas of Interest

Microelectronics, silicon VLSI technology, semiconductor nanostructures synthesis and characterization, nanotechnology, molecular electronics, and fabrication/ characterization of inorganic, organic and polymer electronic-optoelectronic devices for information processing, data storage and optoelectronic sensor applications.

5. Distinctions - Scholarships - Invitations

- **Greek Mathematical Society 2nd Prize**, Cretan Student Competition of the Greek Mathematical Society, 1984.
- **Postgraduate research scholarship**, based on exams, awarded from the Institute of Microelectronics, National Center for Scientific Research (NCSR) DEMOKRITOS.
- **Invited Speaker**, International Workshop on Nanostructures for Electronics and Optics –NEOP-, Germany, October 2002, talk title “*Si-nanocrystal MOS memory devices fabricated by very low-energy ion implantation and subsequent annealing*”.
- **Referee of research papers** for international journals: Semiconductor Science and Technology, Nanotechnology (IOP), Solid State Electronics, Microelectronic Engineering (Elsevier), Applied Physics Letters (AIP).
- **Member of the Program Committee** of the 34th and 35th International conference on Micro- and Nano - Engineering (**MNE** 2008, 2009).

6. Index of Publications

6.1 Dissertations

6a.1. MSc Thesis entitled “***A Study of Transient Photoconductivity in In_{0.53}Ga_{0.47}As/InP Multi-Quantum-Wells***” September 1993, University of Essex, School of Engineering, Department of Physics, UK. Supervisor: A. J. Vickers (Univ. of ESSEX Prof.)

6a.2. PhD Thesis entitled, “***Formation of Semiconductor Nanocrystals by Ultra-Low-Energy Ion-Beam-Synthesis and Memory Devices***”, December 2004, NTUA, School of Applied Mathematics and Physics, Greece. Supervisor: A. Modinos (NTUA Prof.)

6.2. Refereed International Journals

2009

- [1] **E. Kapetanakis**, A.M. Douvas, D.Velessiotis, E. Makarona, P. Argitis, N. Glezos, P. Normand, “*Hybrid organic-inorganic materials for molecular proton memory devices*” *Ogranic Electronics* **10**, 711-718 (2009).

2008

- [2] **E. Kapetanakis**, A.M. Douvas, D.Velessiotis, E. Makarona, P. Argitis, N. Glezos, P. Normand, “*Molecular Storage Elements for Proton Memory Devices*” *Advanced Materials* **20**, 4568 - 4574 (2008).

- [3] **E. Kapetanakis**, P. Normand, P. Holliger, "Electrical properties of metal-oxide-semiconductor structures with low-energy Ge-implanted and annealed thin gate oxides", *J. Appl. Phys.* **103**, 064515-13 (2008).
- [4] E. Makarona, **E. Kapetanakis**, D. Velessiotis, A. Douvas, P. Argitis, P. Normand, T. Gotszalk, M. Woszczyzna, N. Glezos, "Vertical Devices of Self-assembled Hybrid Organic/Inorganic Monolayers based on Tungsten Polyoxometalate", *Microelectronic Engineering* **85**, 1399–1402 (2008).

2004

- [5] P. Normand, **E. Kapetanakis**, P. Dimitrakis, D. Skarlatos, K. Beltsios, D. Tsoukalas, C. Bonafos, G. Ben Asssayag, N. Cherkashin, A. Claverie, J. A. Van Den Berg, V. Soncini, A. Agarwal, M. Ameen, M. Perego, M. Fanciulli, "Nanocrystals manufacturing by ultra-low-energy ion-beam-synthesis for nonvolatile memory applications", *Nucl. Instr. Meth Phys. Res. B (NIMB)* **216**, 228-238 (2004).
- [6] P. Dimitrakis, **E. Kapetanakis**, D. Tsoukalas, D. Skarlatos, C. Bonafos, G. Ben Asssayag, A. Claverie, M. Perego, M. Fanciulli, V. Soncini, R. Sotgiu, A. Agarwal, M. Ameen, P. Normand, "Silicon nanocrystal memory devices obtained by ultra-low-energy ion-beam-synthesis", *Solid State Electronics* **48**, 1511-1517 (2004).
- [7] D. Skarlatos, **E. Kapetanakis**, P. Normand, C. Tsamis, M. Perego, S. Ferrari, M. Fanciulli, D. Tsoukalas, "Oxidation of nitrogen - implanted silicon (ii): Comparison of nitrogen distribution and electrical properties of oxides formed by very low and medium energy N_2^+ implantation", *J. Appl. Phys.* **96**, 300-309 (2004).
- [8] P. Normand, P. Dimitrakis, **E. Kapetanakis**, D. Skarlatos, K. Beltsios, D. Tsoukalas, C. Bonafos, H. Coffin, G. Benassayag, A. Claverie, V. Soncini, A. Agarwal, Ch. Sohl, M. Ameen, "Processing issues in silicon nanocrystal manufacturing by ultra-low-energy ion-beam-synthesis for non-volatile memory applications", *Microelectronic Engineering* **73-74**, 730-735 (2004).

2003

- [9] A. Kanjilal, J. Lundsgaard Hansen, P. Gaiduk, A. Nylandsted Larsen, N. Cherkashin, A. Claverie, P. Normand, **E. Kapetanakis**, D. Skarlatos, D. Tsoukalas, "Structural and electrical properties of silicon dioxide layers with embedded germanium nanocrystals grown by molecular beam epitaxy", *Appl. Phys. Lett.* **82**, 1212-1214 (2003).
- [10] **E. Kapetanakis**, D. Skarlatos, C. Tsamis, P. Normand, D. Tsoukalas, "Influence of implantation energy on the electrical properties of ultrathin gate oxides grown on nitrogen implanted Si substrates", *Appl. Phys. Lett.* **82**, 4764-4766 (2003).
- [11] P. Normand, **E. Kapetanakis**, P. Dimitrakis, D. Tsoukalas, K. Beltsios, N. Cherkashin, C. Bonafos, G. Benassayag, H. Coffin, A. Claverie, V. Soncini, A. Agarwal, M. Ameen, "Effect of annealing environment on the memory properties of thin oxides with embedded Si nanocrystals obtained by low-energy ion beam synthesis", *Appl. Phys. Lett.* **83**, 168-170 (2003).
- [12] P. Dimitrakis, **E. Kapetanakis**, P. Normand, D. Skarlatos, D. Tsoukalas, K. Beltsios, A. Claverie, G. Benassayag, C. Bonafos, D. Chassaing, V. Soncini,

"MOS memory structures by very low energy implanted Si in thin SiO₂", *Mat. Sc. and Eng. B* **101**, 14-18 (2003).

- [13] P. Normand, **E. Kapetanakis**, P. Dimitrakis, D. Skarlatos, D. Tsoukalas, K. Beltsios, A. Claverie, G. Benassayag, C. Bonafos, M. Carrada, N. Cherkashin, V. Soncini, A. Agarwal, Ch. Sohl, M. Ameen, "Effects of annealing conditions on charge storage of Si nanocrystal memory devices obtained by low-energy ion beam synthesis", *Microelectronic Engineering* **67-68**, 629-634 (2003).

2002

- [14] **E. Kapetanakis**, P. Normand, D. Tsoukalas, K. Beltsios, "Room-temperature single-electron charging phenomena in large-area nanocrystal memory obtained by low-energy ion beam synthesis", *Appl. Phys. Lett.* **80**, 2794-2796 (2002).
- [15] **E. Kapetanakis**, P. Normand, D. Tsoukalas, K. Beltsios, "Influence of implantation dose on the charge storage characteristics of MOS memory devices with low energy Si implanted gate oxides", *Microelectronic Engineering* **61-62**, 505-510 (2002).
- [16] K. Beltsios, P. Normand, **E. Kapetanakis**, D. Tsoukalas, A. Travlos, "Evolution and control of the structure of a SiO₂/semiconductor nanoelectronics material", *Microelectronic Engineering* **61-62**, 631-635 (2002).

2001

- [17] P. Normand, **E. Kapetanakis**, D. Tsoukalas, A. Tserepi, E. Tsoi, K. Beltsios, K. Aidinis, S. Zhang, J. Van Den Berg, "Silicon-nanocrystal based multiple tunnel junction devices obtained by a combination of V-groove and ion beam synthesis techniques", *Microelectronic Engineering* **57-58**, 1003-1007 (2001).
- [18] P. Normand, K. Beltsios, **E. Kapetanakis**, D. Tsoukalas, T. Travlos, J. Stoemenos, J. Van Den Berg, S. Zhang, C. Vieu, H. Launois, J. Gautier, F. Jourdan, L. Palun, "Formation of 2-D arrays of semiconductor nanocrystals or semiconductor-rich nanolayers by very low energy Si or Ge ion implantation in silicon oxide films", *Nucl. Instr. Meth Phys. Res. B (NIMB)* **178**, 74-77 (2001).
- [19] P. Normand, **E. Kapetanakis**, D. Tsoukalas, G. Kamoulakos, K. Beltsios, J. Van Den Berg, S. Zhang, "MOS memory devices based on silicon nanocrystal arrays fabricated by very low energy ion implantation", *Materials Science Engineering C* **15**, 145-147 (2001).

2000

- [20] **E. Kapetanakis**, P. Normand, D. Tsoukalas, K. Beltsios, J. Stoemenos, S. Zhang, J. van den Berg, "Charge storage and interface states effects in Si-nanocrystal memory obtained using low-energy Si⁺ implantation and annealing", *Appl. Phys. Lett.* **77**, 3450-3452 (2000).

1998

- [21] P. Normand, D. Tsoukalas, **E. Kapetanakis**, J. A. Van Den Berg, D. G. Armour, J. Stoemenos; C. Vieu, "Formation of 2-D arrays of silicon nanocrystals in thin SiO₂ films by very-low energy Si⁺ ion implantation", *Electrochemical and Solid-State Letters* **1**, 88-90 (1998).

- [22] P. Normand, D. Tsoukalas, C. Aidinis, A. Tserepi, D. Kouvatsos, **E. Kapetanakis**, "Fabrication of Si nano-wires using anisotropic dry and wet etching", *Microelectronic Engineering* **41/42**, 551-554 (1998).
- [23] D. Tsoukalas, P. Normand, C. Aidinis, **E. Kapetanakis**, P. Argitis, "Fabrication of Si nanodevices by optical lithography and anisotropic etching", *Microelectronic Engineering* **41/42**, 523-526 (1998).

1997

- [24] P. Normand, D. Tsoukalas, **E. Kapetanakis**, J. A. Van Den Berg, D. G. Armour, J. Stoemenos, "Silicon nanocrystal formation in thin thermal-oxide films by very-low energy Si⁺ ion implantation", *Microelectronic Engineering* **36**, 79-82 (1997).

1995

- [25] A. J. Vickers, and **L. Kapetanakis**, "Transient Photoconductivity in In_{0.53}Ga_{0.47}As/InP Multiple Quantum Wells", *Semiconductor Science and Technology* **10**, 829-834 (1995).

Chapters in books

- [1] **E. Kapetanakis**, P. Normand, K. Beltsios, D. Tsoukalas, *Nanocrystal memories* in: H. S. Nalwa (Ed.), *Encyclopedia of Nanoscience and Nanotechnology*, American Scientific Publishers, USA, Vol.6, pp. 321-340, 2004.

6.3 Refereed International Conference Proceedings

- [1] G. Ben Assayag, C. Bonafos, M. Carrada, D. Chassaing, P. Normand, D. Tsoukalas, P. Dimitrakis, **E. Kapetanakis**, V. Soncini, M. Fanciulli, M. Perego and A. Claverie, *Depth positioning of silicon nanoparticles created by ULE implants in ultra-thin SiO₂*, in Proceedings of Ion Implantation Technology Conference 02, IIT 2002, pp. 645-648, 2003.
- [2] A. Nylandsted Larsen, A. Kanjilal, J. Lundsgaard Hansen, P. Gaiduk, N. Cherkashin, A. Claverie, P. Normand, **E. Kapetanakis**, D. Tsoukalas, K.-H. Heinig, *Germanium quantum dots in SiO₂: fabrication and characterization*, in: V. E. Borisenko, S. V. Gaponenko, V. S. Gurin (Eds), *Physics, Chemistry and Application of Nanostructures*, World Scientific, pp. 439-442, 2003.
- [3] **E. Kapetanakis**, P. Normand, D. Tsoukalas, G. Kamoulakos, D. Kouvatsos, J. Stoemenos, S. Zhang, J. Van Den Berg, and D. G. Armour, *MOS Memory Using Silicon Nanocrystals Formed by Very-Low Energy Ion Implantation*, in: W. A. Lane, G. M. Crean, F. A. McCabe, H. Grunbacher (Eds), *Proceedings of the 30th European Solid-State Device Research Conference, ESSDERC'00*, pp. 476-479, 2000.
- [4] **E. Kapetanakis**, P. Normand, D. Tsoukalas, K. Beltsios, S. Zhang, J. Van Den Berg, and J. Stoemenos, *Si nanocrystal MOS memory obtained by low-energy ion beam synthesis*, in A. G. Nassiopoulou and X. Zianni (Eds), *Microelectronics Microsystems Nanotechnology, MMN-2000*, World Scientific, pp. 29-32, 2000.
- [5] K. Beltsios, P. Normand, **E. Kapetanakis**, D. Tsoukalas, A. Travlos, J. Gautier, F. Jourdan, and P. Hollinger, *Ge/SiO₂ thin layers through low-energy Ge⁺*

implantation and annealing: Nanostructure evolution and electrical characteristics", in A. G. Nassiopoulou and X. Zianni (Eds), *Microelectronics Microsystems Nanotechnology, MMN-2000*, World Scientific, pp. 69-72, 2000.

- [6] **E. Kapetanakis**, P. Normand, D. Tsoukalas, K. Beltsios, T. Travlos, J. Gautier, L. Palun, and F. Jourdan, *Structure and memory effects of low energy Ge-implanted thin SiO₂ films*, in: H. E. Maes, R. P. Mertens, G. Declerck, H. Grunbacher (Eds), *Proceedings of the 29th European Solid-State Device Research Conference, ESSDERC'99*, pp. 432-435, 1999.

Conference presentations

- [1] **E. Kapetanakis**, A.M. Douvas, D. Velessiotis, E. Makarona, P. Argitis, N. Glezos, P. Normand, *"Molecular proton memory"*, **34th International Conference on Micro & Nano Engineering**, Greece, September 2008.
- [2] E. Makarona, A.M. Douvas, **E. Kapetanakis**, D. Velessiotis, P. Argitis, P. Normand, N. Glezos, J. Mielczarski, E. Mielczarski, T. Gotszalk, M. Woszczyna, *"Charging Effects in Hybrid Structures Based on Polyoxometalate Layers for Molecular Memory Applications"*, **2007 MRS Fall Meeting**, USA, November 2007.
- [3] P. Dimitrakis, **E. Kapetanakis**, D. Tsoukalas, D. Skarlatos, C. Bonafos, G. Ben Assayag, A. Claverie, M. Perego, M. Fanciulli, V. Soncini, R. Sotgiu, A. Agarwal, M. Ameen, P. Normand, *"Silicon nanocrystal memory devices obtained by ultra-low-energy ion-beam-synthesis"*, *ESSDERC international satellite workshop on non volatile memories with discrete storage nodes*, Portugal, September 2003.
- [4] A. Claverie, C. Bonafos, M. Carrada, G. Benassayag, D. Chassaing, P. Normand, P. Dimitrakis, **E. Kapetanakis**, T. Muller, K.H. Heinig, M. Perego, M. Fanciulli, V. Soncini, D. Mathiot, *"Materials science issues for the fabrication of 2D-arrays of Si nanoparticles embedded in ultrathin SiO₂ layers: Towards high performance structures"*, *ESSDERC international satellite workshop on non volatile memories with discrete storage nodes*, Portugal, September 2003.
- [5] A. Agarwal, C. Sohl, M. Ameen, A. Claverie, G. Ben Assayag, D. Chassaing, V. Soncini, **E. Kapetanakis**, P. Normand, D. Tsoukalas, K. Beltsios, *"Ultra-low energy Si implantation for Si nano-particles for single transistor memories"*, *Ion Implantation Technology Conference, IIT02*, USA, September 2002.
- [6] A. Kanjilal, J. Lundsgaard Hansen, P. Gaiduk, A. Nylandsted Larsen, P. Normand, **E. Kapetanakis**, D. Skarlatos, D. Tsoukalas, C. Bonafos, M. Kattada, A. Claverie, *"Germanium nanocrystals embedded into SiO₂ using molecular beam epitaxy"*, *International workshop on Nanostructures for Electronics and Optics –NEOP-*, Germany, October 2002.
- [7] Bonafos, M. Carrada, G. Ben Assayag, D. Chassaing, P. Normand, D. Tsoukalas, P. Dimitrakis, **E. Kapetanakis**, V. Soncini, A. Claverie, *"Effect of ion implantation energy and dose on the positioning of Si nanoparticles embedded in ultrathin SiO₂ layers"*, *International workshop on Nanostructures for Electronics and Optics –NEOP-*, Germany, October 2002.
- [8] P. Normand, D. Tsoukalas, **E. Kapetanakis**, J. A. Van Den Berg, D. G. Armour, J. Gautier, L. Palun, F. Jourdan, T. Travlos, K. Beltsios, C. Vieu, H. Launois, J. Stoemenos, *"Formation of SC nanocrystals in thin SiO₂ Films by ion beam synthesis: Application to memory devices"*, *Advanced Research Initiative in*

Microelectronics MEL-ARI -Nano-Scale Integrated Circuits' 2st annual workshop, Marseille, Feb. 1999.

- [9] P. Normand, D. Tsoukalas, **E. Kapetanakis**, K. Aidinis, D. Kouvatsos, A. Tserepi, E. Tsoi, M. Hatzakis, J. A. Van Den Berg, D. G. Armour, J. Stoemenos, “*Towards single electronics using ion beam synthesis and optical lithography*”, *Advanced Research Initiative in Microelectronics (MEL-ARI) Nano-Scale Integrated Circuits 1st Annual Workshop*, Lille, France, February 1998.
- [10] **E. Kapetanakis**, P. Normand, D. Tsoukalas, D. Kouvatsos, J.A. van den Berg, D.G. Armour, J. Stoemenos, “*Resonant tunneling through two-dimensional arrays of silicon nanocrystals formed by very low energy Si⁺ ion implantation in thin SiO₂ films*”, *General Conference of the Condensed Matter Division of the European Physical Society*, Grenoble, France, August 1998.

Invited talks

- [1] P. Normand, **E. Kapetanakis**, P. Dimitrakis, D. Skarlatos, K. Beltsios, D. Tsoukalas, C. Bonafos, G. Ben Asssayag, N. Cherkashin, A. Claverie, J. A. Van Den Berg, V. Soncini, A. Agarwal, M. Ameen, M. Perego, M. Fanciulli, “*Nanocrystals manufacturing by ultra-low-energy ion-beam-synthesis for nonvolatile memory applications*”, *European Materials Research Society Conference, E-MRS03*, France, June 2003.
- [2] **E. Kapetanakis**, P. Normand, D. Tsoukalas, K. Beltsios, P. Dimitrakis, A. Claverie, G. Ben-Assayag, C. Bonafos, V. Soncini, A. Agarwal, C. Sohl, “*Si-nanocrystal MOS memory devices fabricated by very low-energy ion implantation and subsequent annealing*”, *International Workshop on Nanostructures for Electronics and Optics –NEOP-*, Germany, October 2002.
- [3] D. Tsoukalas, **E. Kapetanakis**, P. Normand, S. Zhang, and J. Van Den Berg, “*Nanocrystal MOS memory using very low-energy Si-implanted gate oxide*”, **3rd** *International Workshop on Future Information Processing Technologies*, British Columbia, Canada, August 1999.

7. Patents

E. Kapetanakis, A.M. Douvas, D. Velessiotis, E. Makarona, P. Argitis, N. Glezos, P. Normand, “Memory devices using proton-conducting polymeric materials”, Greek Patent (OBI) Appl. No 20080100269, 18 April 2008, and International patent application (PCT/GR2009/000023, 14/04/2009), Publication number: WO 2009127884 (A1), Publication date: 2009-10-22.