

## PANAGIOTIS ARGITIS

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### 1. Summary

Panagiotis Argitis is leading the Research Activity on Materials for Nanolithography and Organic Electronics (Part of the Research Program on Nanoelectronics, Photonics and Microsystems) at the Institute of Nanoscience and Nanotechnology of NCSR Demokritos.

Current research interests :

- Organic Electronics : Interfaces in OLEDs and OPVs, Memories, Sensors, Molecular electronics.
- Lithographic Materials and Processes : Polymeric materials for optical and next generation lithographic technologies - Molecular glasses - Radiation induced processes for micro-nanofabrication and nanobiotechnology.
- Polyoxometalates/Transition Metal Oxides : Chemistry, Applications in electronic devices and energy conversion.

*See also research profile and publications at*

[https://www.researchgate.net/profile/Panagiotis\\_Argitis](https://www.researchgate.net/profile/Panagiotis_Argitis),

*and*

<https://scholar.google.gr/citations?user=zAw1PK0AAAAJ&hl=el>.

### 2. Professional positions

- 2004 – today, Director of Research at NCSR Demokritos (2013 - today at the Institute of Nanoscience and Nanotechnology, and 2004-2013 at the Institute of Microelectronics)
- 1995-2004, Researcher Grade C (1995-1999) and B (1999-2004) at the Institute of Microelectronics, NCSR Demokritos,
- 1992-1995 Post-Doctoral Researcher at the Institute of Microelectronics, NCSR Demokritos (Mike Hatzakis group),
- 1991-1992, Teaching Associate (Visiting Assistant Professor), Department of Chemistry, University of Crete, Greece,
- 1988-1991, Post Doctoral Researcher, Department of Chemical Engineering, University of Texas at Austin, USA (Adam Heller's group)

### 3. Education

- B.Sc. in Chemistry, University of Athens, Greece, 1981
- Ph.D. in Photochemistry/Photocatalysis, Institute of Physical Chemistry-NCSR Demokritos/University of Athens, 1987.  
Advisor Dr E. Papaconstantinou, Dissertation on Sensitization and Multielectron Photoreduction of Polyoxometallates for Hydrogen Production

### 4. Publications 2014-2015

1. M. Vasilopoulou, D. G. Georgiadou, A. M. Douvas, A. Soultati, V. Constantoudis, D. Davazoglou, S. Gardelis, L. C. Palilis, M. Fakis, S. Kennou, T. Lazarides, A.G. Coutsolelos, and P. Argitis, "Porphyrin oriented self-assembled nanostructures for efficient exciton dissociation in high-performing organic photovoltaics", **J. Mater. Chem. A**, **2**, 182-192, 2014
2. M. Vasilopoulou, A. Soultati, D. G. Georgiadou, T. Stergiopoulos, L. C. Palilis, S. Kennou, N. A. Stathopoulos, D. Davazoglou and P. Argitis, "Hydrogenated under-stoichiometric tungsten oxide anode interlayers for efficient and stable organic photovoltaics", **J. Mater. Chem. A**, **2**, 1738-1749, 2014
3. M.-I. Georgaki, A. Botsialas, P. Argitis, N. Papanikolaou, P. Oikonomou, I. Raptis, J. Rysz, A. Budkowski, M. Chatzichristidi, "1-D polymeric photonic crystals as spectroscopic zero-power humidity sensors", **Microelectronic Engineering**, **115**, 55-60, 2014
4. A. Soultati, D.G. Georgiadou, A. Douvas, P. Argitis, D. Alexandropoulos, N.A. Vainos, N.A. Stathopoulos, G. Papadimitropoulos, D. Davazoglou, M. Vasilopoulou, "The role of metal/metal oxide/organic anode interfaces in efficiency and stability of bulk heterojunction organic photodetectors", **Microelectronic Engineering**, **117**, 13-17, 2014
5. A. Soultati, A. M. Douvas, D.G. Georgiadou, L. C. Palilis, T. Bein, J. M. Feckl, S. Gardelis, M. Fakis, S. Kennou, P. Falaras, T. Stergiopoulos, N. A. Stathopoulos, D. Davazoglou, P. Argitis and M. Vasilopoulou, "Solution-Processed Hydrogen Molybdenum Bronzes as Highly Conductive Anode Interlayers in Efficient Organic Photovoltaics", **Advanced Energy Materials**, **4(3)**, 2014, DOI: 10.1002/aenm.201300896
6. M. Vasilopoulou, A. M. Douvas, D. G. Georgiadou, V. Constantoudis, D. Davazoglou, S. Kennou, L. C. Palilis, D. Daphnomili, A. G. Coutsolelos and P. Argitis, "Large Work Function Shift of Organic Semiconductors Inducing Enhanced Interfacial Electron Transfer in Organic Optoelectronics Enabled by Porphyrin Aggregated Nanostructures", **Nano Research**, **7**, 679-93, 2014
7. E. Polydorou, E. Makarona, A. Soultati, D. Georgiadou, T. Kyrasta, T. Speliotis, C. Tsamis, N. Papanikolaou, P. Argitis, I. Kostis, A. Kokkosis, D. Davazoglou and M. Vasilopoulou, "Solution-processed nanostructured zinc oxide cathode interfacial layers for efficient inverted organic photovoltaics", **Microelectronic Engineering**, **119**, 100-104, 2014
8. George Pasparakis, Theodore Manouras, Maria Vamvakaki and Panagiotis Argitis, "Harnessing photochemical internalization with dual degradable nanoparticles for combinatorial photo-chemotherapy", **Nature Communications**, **5**, doi:10.1038/ncomms4623, 7 April 2014
9. Giannoula Theodorakopoulos, Nektarios N Lathiotakis, Dimitra G Georgiadou, Maria Vasilopoulou, Panagiotis Argitis, "Theoretical Study on the Electronic Structure of Triphenyl Sulfonium Salts: Electronic Excitation and Electron Transfer Processes", **Chemical Physics Letters**, **601**, 63-68, 2014
10. Maria Vasilopoulou, Anastasia Soultati, Panagiotis Argitis, Thomas Stergiopoulos, and Dimitris Davazoglou, "Fast Recovery of the High Work Function of Tungsten and Molybdenum Oxides via Microwave Exposure for Efficient Organic Photovoltaics", **J. Phys. Chem. Letters**, **5**, 1871-1879, 2014
11. A.M Douvas, M. Vasilopoulou, D.G Georgiadou, A. Soultati, D. Davazoglou, N. Vourdas, K.P Giannakopoulos, A. Kontos, S. Kennou, P. Argitis, "Sol-gel synthesized, low-temperature processed, reduced molybdenum peroxides for organic optoelectronics applications", **J. Mater. Chem. C**, **2**, 6290-6300, 2014, (DOI: 10.1039/C4TC00301B)
12. M. Vasilopoulou, D. G. Georgiadou, A. Soultati, N. Boukos, S. Gardelis, L. C. Palilis, M. Fakis, G. Skoulatakis, S. Kennou, M. Botzakaki, S. Georga, C. A. Krontiras, F. Auras, D. Fattakhova-Rohlfing, T. Bein, T.A. Papadopoulos, D. Davazoglou, and P. Argitis "Atomic Layer Deposited Aluminum and

Zirconium Oxides for Surface Passivation of TiO<sub>2</sub> in High-Efficiency Organic Photovoltaics”, **Advanced Energy Materials** **4** (15), 1400214, 2014.

13. P. Pavli, P. S. Petrou, A. M. Douvas, D. Dimotikali, S. E. Kakabakos, P. Argitis, Protein-resistant crosslinked poly(vinyl alcohol) micropatterns via photolithography using removable polyoxometalate photocatalyst, **ACS Appl. Mater. Interfaces** **6**: 17463-17473, 2014.
14. M Vasilopoulou, N Konofaos, D Davazoglou, P Argitis, NA Stathopoulos, Stelios P Savaidis, Agis A Iliadis, Organic photovoltaic performance improvement using atomic layer deposited ZnO electron-collecting layers, **Solid-State Electronics** **101**, 50-56, 2014
15. D G Georgiadou, M Ulmeanu, M Kompitsas, P Argitis, M Kandyla, Scalable fabrication of nanostructured p-Si/n-ZnO heterojunctions by femtosecond-laser processing, **Materials Research Express** **1**, 045902, 2014
16. A. Balliou, A. M. Douvas, P. Normand, D. Tsikritzis, S. Kennou, P. Argitis, and N. Glezos, Tungsten polyoxometalate molecules as active nodes for dynamic carrier exchange in hybrid molecular/semiconductor capacitors, **Journal of Applied Physics** **116**, 143703, 2014 (doi: 10.1063/1.4897397)
17. M Vasilopoulou, DG Georgiadou, A Soultati, AM Douvas, G Papadimitropoulos, D QDavazoglou, G Pistolis, NA Stathopoulos, T Kamalakis, D Alexandropoulos, N Vainos, CT Politi, LC Palilis, S Couris, AG Coutsolelos, P Argitis, Solution processed multi-color organic light emitting diodes for application in telecommunications, **Microelectronic Engineering**, **145**, 21-28, 2015 (doi:10.1016/j.mee.2015.02.005)
18. D Chavelas, P Oikonomou, A Botsialas, P Argitis, N Papanikolaou, D Goustouridis, K Beltsios, E Lidorikis, I Raptis, M Chatzichristidi, Lithographically tuned one dimensional polymeric photonic crystal arrays, **Optics & Laser Technology**, **68**, 105-112, 2015 (doi :10.1016/j.optlastec.2014.11.008)
19. M. Vasilopoulou, A. M Douvas, L. Palilis, S. Kennou, P. Argitis, Old Metal Oxide Clusters in New Applications: Spontaneous Reduction of Keggin and Dawson Polyoxometalate Layers by a Metallic Electrode for Improving Efficiency in Organic Optoelectronics, **J. Am. Chem. Soc.**, Article ASAP, DOI: 10.1021/jacs.5b01889, Publication Date (Web): May 7, 2015

## 5. Publications (complete list)

### a. Journal publications

1. P. Argitis, and E. Papaconstantinou, "Photocatalytic Multielectron Photoreduction of 18-Tungstodiphosphate in the Presence of Organic Compounds - Production of Hydrogen", **J. Photochem.**, **30**, 445-451, 1985.
2. P. Argitis, and E. Papaconstantinou, "Vanadium Sensitized Photochemistry of Heteropoly Compounds. Mixed Molybdo- and Tungstovanadates", **Inorg. Chem.**, **25**, 4386-4389, 1986.
3. J.C. Carls, P. Argitis, and A. Heller, "Deep Ultraviolet Photoresist Based on Tungsten Polyoxometalates and Poly(Vinyl Alcohol) for Bilayer Photolithography", **J. Electrochem. Soc.**, **139**, 786-793, 1992.
4. P. Argitis, R.A. Srinivas, J.C. Carls, and A. Heller, "Micropatterned Films of Tungsten Nuclei for Subsequent Metallization Formed of Phosphotungstic Acid-Based Negative Resist", **J. Electrochem. Soc.**, **139**, 2889-2894, 1992.
5. E. Papaconstantinou, A. Ioannidis, A. Hiskia, P. Argitis, D. Dimotikali, and S. Korres, "Photocatalytic Processes by Polyoxometalates. Splitting of Water. The Role of Dioxygen." **Molecular Engineering**, **3**, 231- 239, 1993.

6. J. Everett, and C. Piechocki; P. Argitis and M. Hatzakis, " Surfactant Modified Epoxy Resins as Novel Negative Acting Deep UV Photoresists ", **J. Appl. Polym. Sci.**, **58**, 179-183, 1995.
7. P. Argitis, I. Raptis, C. J. Aidinis, N. Glezos, M. Baciocchi, J. Everett and M. Hatzakis, "An advanced epoxy novolac resist for fast high resolution e-beam lithography", **J. Vac. Sci. Technol. B**, **13** (6), 3030, 1995.
8. N. Glezos, G.P. Patsis, I. Raptis, P. Argitis, M. Gentili and L. Grella, "Application of a reaction-diffusion model for negative chemically amplified resists to determine electron-beam proximity correction parameters", **J. Vac. Sci. Technol. B.**, **14** (6), 4252, 1996.]
9. I. Raptis, L. Grella, P. Argitis, M. Gentili, N. Glezos, G. Petrocco, "Determination of acid diffusion and energy deposition parameters by point e-beam exposure in chemically amplified resists", **Microelectron. Eng.**, **30**, 295- 299, 1996.
10. J.P. Everett, D.L. Schmidt, G.D. Rose, and P. Argitis, C.J. Aidinis, M. Hatzakis, "Synthesis of some onium salts and their comparison as cationic photoinitiators in an epoxy resist ", **Polymer**, **38**, 1719-1723, 1997.
11. G. Patsis, I. Raptis, N. Glezos, P. Argitis, M. Hatzakis, C.J. Aidinis, M. Gentili, R. Maggiora, "Gel formation theory approach for the modelling of negative chemically amplified e-beam resists", **Microelectron. Eng.**, **35**, 157-60, 1997.
12. G. P. Patsis, G. Meneghini, N. Glezos, P. Argitis, "Theoretical discussion of diffusion effects in negative chemically amplified resists based on contrast curve simulation " **J. Vac. Sci. Technol. B.**, **15**, 2561, 1997.
13. P. Argitis, M. A. Vasilopoulou, E. Gogolides, E. Tegou, M. Hatzakis, Z. Kollia, A.C. Cefalas, "Etch resistance enhancement and absorbance optimization with polyaromatic compounds for the design of 193 nm photoresists", **Microelectron. Eng.**, **41/42**, 355-358, 1998.
14. D. Davazoglou, M. A. Vasilopoulou, P. Argitis, " Optical characterization of thin organic films by analysing transmission measurements with the Forouhi - Bloomer model", **Microelectron. Eng.**, **41/42**, 619-622, 1998.
15. I. Raptis, N.Glezos, A.Rosenbusch, G.Patsis, P.Argitis, "Calculation of energy deposition in the resist films over multilayer substrates", **Microelectron. Eng.**, **41/42**, 171-174, 1998.
16. A.C. Cefalas, P. Argitis, Z. Kollia, E. Sarantopoulou, T. W. Ford, A. D. Stead, A. Marranca, C. N. Danson, J. Knott, D. Neely, "Laser Plasma X-Ray Contact Microscopy of Living Specimens Using a Chemically Amplified Epoxy Resist", **Appl. Phys. Letters**, **72**, 3258-3260, 1998.
17. D.Tsoukalas, P.Normand, C.Aidinis, E.Kapetanakis, P.Argitis, "Fabrication of Si nanodevices by optical lithography and anisotropic etching", **Microelectron. Eng.**, **41/42**, 523-526, 1998.
18. E. Tegou, E. Gogolides, P. Argitis, M. Hatzakis, "Silylation of epoxy functionalized photoresists for optical, e-beam lithography and micromachining applications", **Microelectron. Eng.**, **41/42**, 335-338, 1998.
19. E. Tegou, E. Gogolides, P. Argitis, I. Raptis, M. Hatzakis, G. Meneghini, Z. Cui, "Silylation and Dry development of Chemically Resists SAL 601, AZPN 114, and EPR for High Resolution Electron-Beam Lithography", **Jpn. J. Appl. Phys.**, **37**, 77- 80, 1998.
20. A. C. Cefalas, E. Sarantopoulou, P. Argitis, E. Gogolides, "Mass spectroscopic and degassing characteristics of polymeric materials for 157 nm photolithography", **Appl. Phys. A**, **69S**, 929-933, 1999.
21. E. Ioakimoglou, S. Boyatzis, P. Argitis, K. Papanagiotou, A. Fostiridou and N. Yannovits, "Thin film study on the oxidation of linseed oil in the presence of selected copper pigments", **Chem. Mater.**, **11**, 2013-2022, 1999.
22. Y. Seo, K. Lee, M. Yi, E. Seo, B. K. Choi, O. Kim, I. Raptis, P. Argitis, M. Hatzakis, "Evaluation of advanced epoxy novolac resist, EPR, for sub 100nm synchrotron x-ray proximity lithography", **Microelectron. Eng.**, **46**, 461-464, 1999.
23. P. Argitis, N. Glezos, M. Vasilopoulou, I. Raptis, M. Hatzakis, J. Everett, G. Meneghini, A. Palumbo, M. Ardito, P. Hudek and I. Kostic, "Aqueous developable epoxy resist for high sensitivity electron beam lithography", **Microelectron. Eng.**, **53**, 453-456, 2000.
24. A. C. Cefalas, E. Sarantopoulou, E. Gogolides, P. Argitis, "Absorbance and outgassing of photoresist polymeric materials for UV lithography below 193 nm, including 157 nm lithography", **Microelectron. Eng.**, **53**, 123-126, 2000.

25. I. Raptis, D. Velesiotis, M. Vasilopoulou, P. Argitis, "Development mechanism study by dissolution monitoring of positive methacrylate photoresists", **Microelectron. Eng.**, **53**, 489-492, 2000.
26. N. Glezos, P. Argitis, D. Velesiotis, I. Raptis, P. Hudek and I. Kostic, "Aqueous base development and acid diffusion length optimization in negative epoxy resist for electron beam lithography", **J. Vac. Sci. Technol. B.**, **18(6)**, 3431-3434, 2000.
27. I. Raptis, N. Glezos, E.S. Valamontes, Zervas, P. Argitis, "Electron beam lithography simulation for high resolution and high-density patterns", **Vacuum**, **62**, 263-271, 2001.
28. I. Raptis, M. Chatzichristidi, C. D. Diakoumakos, A. Douvas, D. Niakoula, P. Argitis, "Application of a novel aqueous base developable resist in micromachining", **J. Photopol. Sci. and Tech.** **14**, 445-448, 2001.
29. E. Sarantopoulou, A.C. Cefalas, P. Argitis, E. Gogolides, "Photoresist Materials for 157-nm Photolithography", **Mat. Sci. Eng. C, Bio S**, **15**, 159-161, 2001.
30. G. Mladenov, K. Vutova, I. Raptis, P. Argitis, I. Rangelow, R. Kaesmeier, S. Hirshler, "Simulation of Latent Image Formation for Ion Beam Projection Lithography", **Microelectron. Eng.**, **57-58**, 335-342, 2001.
31. C. D. Diakoumakos, I. Raptis, A. Tserepi, P. Argitis, "Negative (meth)acrylate resist materials based on novel crosslinking chemistry", **Microelectron. Eng.**, **57-58**, 539-545, 2001.
32. A. Douvas, P. Argitis, C.D. Diakoumakos, K. Misiakos, D. Dimotikali, S.E. Kakabacos, "Photolithographic Patterning of Proteins with Photoresists Processable under Biocompatible Conditions", **J. Vac. Sci. Technol. B.**, vol. **19**, 2820-2824, 2001.
33. S. Boyatzis, E. Ioakimoglou, P. Argitis, "UV Exposure and Temperature Effects on the Curing Mechanisms in Linseed Oil Thin Films : Spectroscopic and Chromatographic Studies ", **J. Appl. Polym. Sci.**, **84**, 936-949, 2002.
34. A. Douvas, P. Argitis, K. Misiakos, D. Dimotikali, P.S. Petrou, S. Kakabacos, "Biocompatible Photolithographic Process for the Patterning of Biomolecules", **Biosensors and Bioelectronics**, **17**, 269-278, 2002.
35. P.S. Petrou, S. Kakabacos, I. Christofidis, P. Argitis, K. Misiakos, "Multi-Analyte Capillary Immunosensor for the Determination of Hormones in Human Serum Samples", **Biosensors and Bioelectronics**, **17**, 261-268, 2002.
36. C. D. Diakoumakos, I. Raptis, A. Tserepi and P. Argitis, "Free-radical synthesis of narrow polydispersed 2-hydroxyethyl methacrylate based tetrapolymers for dilute aqueous base developable negative photoresists", **Polymer**, **43**, 1103-1113, 2002.
37. G. Pistolis, S. Boyatzis, M. Chatzichristidi, P. Argitis, "Highly Efficient Bicolor (Green-Blue) Fluorescence Imaging in Polymeric Films", **Chem. Mater.**, **14**, 790-796, 2002.
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40. M. Chatzichristidi, I. Raptis, C.D. Diakoumakos, N. Glezos, P. Argitis, M. Sanopoulou, "Strippable, aqueous base developable, negative photoresist for high aspect ratio micromachining", **Microelectron. Eng.**, **61-2**, 729-735, 2002.
41. M. Chatzichristidi, I. Raptis, P. Argitis, J. Everett, "Partially hydrogenated poly(vinyl phenol) based photoresist for near UV, High aspect ratio micromachining", **J. Vac. Sci. Technol. B**, **20**, 2968-2972, 2002.
42. V. Bellas, E. Tegou, I. Raptis, E. Gogolides, P. Argitis, H. Iatrou, N. Hatjichristidis, E. Sarantopoulou, A.C. Cefalas, "Evaluation of siloxane and polyhedral oligomeric silsesquioxane copolymers for 157 nm lithography", **J. Vac. Sci. Technol. B**, **20**, 2902-2908, 2002.
43. E. Gogolides, P. Argitis, E. Couladouros, V. Vidali, M. Vasilopoulou, G. Cordoyannis, C.D. Diakoumakos, A. Tserepi, "Photoresist etch resistance enhancement using novel polycarbocyclic derivatives as additives", **J. Vac. Sci. Technol. B**, **21**, 141-147, 2003.

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## b. Book Chapters

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