Curriculum Vitae

Dr Constantinos M. Paleos

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Education

Diploma in Chemistry, University of Athens, Greece, (1964)

PhD in Chemistry, Drexel University, Philadelphia, Pa, USA, (1970).

Appointments

Mar. 1966 - Aug.1966: N.R.C. "Demokritos", Research Assistant. Sept.1966.

Feb 1970: Graduate Studies at Pennsylvania State and Drexel Universities, USA, Research and Teaching Assistant

Feb.1970-Dec. 1970: Standard Oil Co., IND, Amoco Chemicals, Project Chemist.

Feb. 1971 - Oct. 1973: Motor Oil (Hellas), Project Chemist, Consultant.

Jan. 1973 – July 2007: NCSR "Demokritos", Research Director.

Oct. 1991 - Mar.1992: Visiting Professor at the University Louis Pasteur, Strasbourg, France.

Nov. 1994 - Nov 1999: Director, Institute of Physical Chemistry, NCSR "Demokritos".

Dec. 1994 - Dec.1996: Vice-President of the Board, NCSR "Demokritos"

June 2001- July 2007: Director, Institute of Physical Chemistry

Oct. 2007- Today: Consultant, Collaboration with the scientific personnel of my previous team at the Institute of Physical Chemistry, "Demokritos."

Field of Research and Current Research Interests.

- Supramolecular liquid crystals - Biomimetic liquid crystals - Liquid crystals based on functional dendrimers.
- Molecular recognition between complementary liposomes and also between liposomes and simple monomeric or polymeric molecules.
- Preparation and characterization of liposomes and application as drug delivery systems.
- Functionalization of dendrimers and hyperbranched polymers for prospected applications as drug delivery systems and gene transfection vectors.
- Preparation of dendritic molecular transporters and mechanism of action.
- Application of functional and cross-linked dendrimers and hyperbranched polymers as "Nanosponge" materials for water purification.
- Adhesion, Fusion and Multicompartment Systems formation in interacting vesicles - Modelling cell processes.

Fellowships

1960 - 1964: State Fellowship for Undergraduate Studies at Athens University.

1967 - 1969: NASA Fellowship at Drexel University.

1969 - 1970: Fellowship from the Department of the Army, Edgewood Arsenal Research Laboratories, Maryland, at Drexel University.

Publications

My work is covering an extremely broad spectrum of Science and Technology and has been published (175 original articles and reviews, **Annex 1**) in a diversity of prestigious Journals of high Impact Factor as shown below:

Angewandte Chemie, Journal of Physical Chemistry, Journal of Organic Chemistry, Chemical Society Reviews, Chemical Communications, Chemistry, A European Journal, Advanced Materials, Macromolecules, Biomacromolecules, International Journal of Pharmaceutics, Makromolekulare Chemie, Molecular Pharmaceutics, Liquid Crystals, Molecular Crystals and Liquid Crystals, Journal of Colloid and Interface Science, Journal of Macromolecular Science, Reviews in Macromolecular Chemistry and Physics, Chemistry and Physics of Lipids, Journal of Polymer Science, Polymer Chemistry Edition, Journal of Applied Polymer Science, Polymer and Progress in Colloid and Polymer Science.

Citations: 3421 citations (Source ISI). ***h-index*** *30*.

My work has been cited many times by Nobel Laureate Prof. **J.M. Lehn** and by several other researchers, the majority of which referred with very positive comments to my publications, such as : **D. Reinhoudt**, **J. M. J. Frechet**, **H. Ringsdorf**, **G. Gray, F. M. Menger**, **S. Regen**, **G. M. Whitesides**, **J. H. Fendler**, **N. Plate**, **D. A. Tomalia**, **T. Kunitake**, **V. V. Egorov**, **C. E. Hoyle**, **K. Nagai**, **T. Kato**, **A. Laschewsky**, **G. R. Newkome**, **A. D'Emanuele**, **R. J. Mart**, **P. R. Dvornic**, **H. Jin, Y. Zhou**, **B. Donnio**, **V. Torchilin, R. Haag, S. J. Webb, J.F. W. Keana, N. K. Jain, P. Baglioni, H. Rosemeyer, S. C. Zimmerman, H. Mohwald, R. Angius, S. Diele, M. I-Clerc, C. A. Mirkin, M. Summers, J.R. Baker Jr, C. Tschierske, M. Seiler, K. Binnemans, A. Sosnik, C. Kojima, K. Petrak**, **R. Haag** etc.

Indicative Comments on my publications are included below in Annex 2.

Professional Activities -Other

1. Member of the Greek Chemical Society.
2. Member of the American Chemical Society.
3. Member of the Editorial Board of "Molecular Crystals and Liquid Crystals".
4. Member of the Editorial Board of Journal of Soft Matter.
5. Member of the Editorial Board of JSM Chemistry, JSciMed Central.
6. Member of the Principal Editors of "NanoLife".
7. Member of the Liquid Crystalline Society.
8. Member of COST Management Committee, D11 Supramolecular Chemistry and D27 Prebiotic Chemistry and Origin of Life.
9. Editor of the book «Polymerization in Organized Media», Gordon and Breach Science Publishers, Philadelphia - Paris - Tokyo (1992).

Reviewer of many European and American Journals as shown below:

Due to the diversity of my research activity I have act as reviewer for many prestigious journals as follows: Journal American Chemical Society, Angewandte Chemie, Chemical Reviews, Chemical Commnications, Langmuir, Journal of Physical Chemistry, Chemistry, A European Journal, Liquid Crystals, Macromolecules, Biomacromolecules, Macromolecular Bioscience, Journal of Colloid and Interface Chemistry, Molecular Crystals and Liquid Crystals, Journal of Polymer Science, Polymer Chemistry Edition, Journal of Organic Chemistry, Supramolecular Chemistry, Colloids and Surfaces, Carbohydrate Research, BBA, Biomembranes, etc.

Educational Activities

Participation in the Graduate Programme of Demokritos". Eleven PhD and five MSc degrees were awarded by work performed in our laboratory. Teaching at graduate level at the University of Athens.

Recent Research Funding

1. "Development of a Novel Anticancer Technique Based on the Destruction of Cancer Cells with Bioluminescence Employing Targeted Liposomal and Dendritic Gene Carriers", GSRT, Greece, 2006-2008. Budget: 78.000 Euros.
2. Nanoscale Functionalities for Targeted Delivery of Biopharmaceutics 'NMP' INTEGRATED PROJECT, Contract No NMP4-CT-2006-026723, 2006-2010. Budget: 537.000 Euros.
3. Establishment of DENDRIGEN SA, a spin-off Company for the development of Dendritic Drug Carriers, 2006-2009. Greek Ministry of Development, Funding of 836.381 Euros.

Indicative Comments on my published work

Positive evaluation of my scientific work is included in **Annex 2.**

Brief Analysis of Scientific Work

See Annex 3

Annex 1

Publications- Patents- Presentations

A. PUBLICATIONS

1. C. M. Paleos, Reactions in the Liquid Crystalline Phase, Dissert. Abts. Internat. B, 31, 2574, 1970 - 71 (PhD Thesis, Supervisor, Prof. M.M. Labes, USA).

2. C. M. Paleos, T. M. Laronge and M. M. Labes*, Liquid Crystal Monomers: N - (p - Alkoxybenzylidene)-p-aminostyrenes, Chem. Comm., 1115 (1968).

3. N. M. Karayannis,* C. M. Paleos, L. L. Pytlewski, and M. M. Labes, Binuclear chlorine - Bridged Complexes of Manganese (II) and Nickel (II) chlorides with Pyridine N- oxides, Inorg. Chem., **8**, 2559 (1969).

4. C. M. Paleos*, N. M. Karayiannis and M. M. Labes, Reduction of 2,2,2,6 Tetramethyl - piperidine Nitroxide Radical via Complex Formation with Copper (II Perchlorate, Chem. Comm. 195 (1970).

5. I. Teucher, C. M. Paleos and M. M. Labes*, Properties of Structurally Stabilised Anil - Type Nematic Liquid Crystals, Mol. Cryst. Liq. Cryst., **11**, 187 (1970).

6. C. M. Paleos and M. M. Labes*, Polymerization of a Nematic Liquid Crystal Monomer, Mol. Cryst. Liq. Cryst. **11**, 385 (1970).

7. Κ. Μ. Παλαιός, Υγροί Κρύσταλλοι – Μερικαί Εφαρμογαί εις την Χημεία, Θέματα Συγχρόνου Τεχνολογίας, Τεύχη **5** και **6**, 33, 33 (1972).

8. N. M. Karayiannis*, C. M. Paleos, C. M. Mikulski, L. L. Pytlewski, H. Blum and M. M. Labes, Some Divalent 3d Metal Perchlorate Complexes with 2,2,6,6-Tetramethylpiperidine Nitroxide Free Radical, Inorg. Chim. Acta, **7**, 74 (1973).

9. Κ. Μ. Παλαιός, Σταθεραί Ελεύθεραι Ρίζαι του Νιτροζειδίου – Ιχνηθέται Σπιν Βιολογικών Συστημάτων, Θέματα Συγχρόνου Τεχνολογίας, Τεύχος **11**, 52 (1973).

10. Κ. Μ. Παλαιός, Πετροχημική Βιομηχανία - Πετροχημικά, Θέματα Συγχρόνου Τεχνολογίας , Τεύχος **12**, 30 (1973).

11. C. M. Paleos*, F. S. Varveri and G.A. Gregoriou, Some New Arenesulfonate Leaving Groups Less Reactive than the p -Toluenesulfonate Group, J. Org. Chem., **39**, 3594 (1974).

12. G. A. Gregoriou* and C. M. Paleos, Nucleophillic Assistance in Solvolysis: II. A useful Solvet System for Estimating the Magnitude of Solvent Assistance, Chimica Chronika, New Series, **3**, 103 (1974).

13. Κ. Μ. Παλαιός, Βιομιμητική Χημεία, Χημικά Χρονικά, Γενική Εκδοση ,Τεύχος **2**, 25 (1977).

14. C. M. Paleos* and P. Dais, A Ready Reduction of Some Nitroxide Free Radicals with Ascorbic Acid., Chem. Comm., 345 (1977).

15. C. M. Paleos*, Polymerization of Oriented Monomers. I. Interfacial and Isotropic Polymerization of 4-Vinyl-N-Methyl-pyridinium Methyl-sulfate. J. Polym. Sci, Polym. Letters Edit., **15**, 535 (1977).

16. C. M. Paleos* and P. Dais, Polymerization of Oriented Monomers. II. Polymerization of 4-Vinylpyridinium Perchlorate in Micellar Aggregates. J. Polym. Sci, Polym. Chem. Edit, **16**, 1495 (1978).

17. C. M. Paleos*, G. P. Evagelatos, P. Dais and G. Kipouros, Polymerization of Vinylpyridinium Salts, III. Further studies on the Interfacial and Isotropic Polymerization of 4 - Vinyl-N-methylpyridinium Methylsulfate, J. Polym. Sci., Polym. Chem. Edit. **17**, 1611 (1979).

18. C. M. Paleos* and S. B. Litsas, Reduction of some Nitroxide Free Radicals by Tert-and Di- tert-butylhydroquinones. Chemica Scripta, **12**, 125 (1979).

19. C. M. Paleos* and N. Mimicos. A convenient Two - Phase Chromic Acid Oxidation procedure of Long - chain Aliphatic Aldehydes to Carboxylic Acids., J. of Colloid and Interface Sci., **66**, 595 (1978).

20. C. M. Paleos* and S. Voliotis, Polymerization of Oriented Monomers. IV. Polymerization of p - Acryloyloxybenzylidene - p -butylaniline within Liquid Crystalline Phase, Israel J. Chem., **18**, Nos 3 – 4, 192 (1979).

21. C. M. Paleos*, S. Voliotis, P. Dais and G. Margomenou -Leonidolopoulou, Polymerization of Oriented Monomers. V. Radiation -Induced Polymerization of 3n-Dodecyl-l-vinylimidazolium Iodide in Micellar Aggregates, J. Polym. Sci., Chem. Edit., **18**, 3463 (1980).

22. C. M. Paleos* and A. Malliaris, Chemical Evidence Concerning the Solubilization Site of Undecanal in Micelles. J. Colloid and Interface Sci., **82**, 244 (1982).

23. C. M. Paleos*, S. E. Filippakis and G. Margomenou - Leonidonopoulou, A Novel Method for the Synthesis of Liquid Crystalline Polymers. Preparation by the Interaction of Poly(acryloyl chloride) with Mesogenic Compounds, J. Polym. Sci. Chem. Edit., **19**, 1427 (1981).

24. J. Nikokavouras, G. Vassilopoulos and C. M. Paleos*, Chemiluminescence in Oriented Systems, Chemiluminescence of Lucigeninin Model Membrane Structures, Chem. Commun., 1082 (1981).

25. C. M. Paleos, G. Vassilopoulos and J. Nikokavouras*, Chemiluminescence in Oriented Systems. Chemiluminescence of 10,10'-Dimethyl-9,9'-Biacridinium Nitrate in Miccelar Media, Journal of Photochemistry, **18**, 327 (1982).

26. C. M. Paleos*, G. Margomenou - Leonidonopoulou, S. E. Filippakis, A. Malliaris and P. Dais, Thermotropic Liquid Crystalline Polymers. II. Further Examples on their Synthesis by the Interaction of Poly(acryloyl cloride) with Mesogenic Compounds, J. Polym. Sci, Chem., **20**, 2267 (1982).

27. C. M. Paleos*, C. Christias, G. P. Evagelatos and P. Dais, Polymerization of Oriented Monomers VI. Polymerization of Monomeric Di(undecenyl)phosphate Vesicles to Stable Polymeric Vesicles J. Polym. Sci., Chem. Edit., **20**, 2565 (1982).

28. A. Malliaris, C. Christias, G. Margomenou - Leonidopoulou and C. M. Paleos*, Single Chain Quaternary Ammonium Salts Exhibiting Thermotropic Mesomorphism and Organization in Water, Mol. Cryst. Liq. Cryst. **82**, 161 (1982).

29. C. M. Paleos, C.I. Stassinopoulou and Angelos Malliaris*, Comparative Studies between Monomeric and Polymeric Sodium 10-Undecenoate, J. Phys. Chem., **87**, 251 (1983).

30. C. M. Paleos* and P. Dais, "Polymerization of Allyldimethyldodecylammonium bromide Liquid Crystalline Monomer to its Liquid Crystalline Polymer", Recent Advances in Liquid Crystalline Polymers, Elsevier Applied Science Publishers Ltd, p.89 (1984).

31. C. M. Paleos* and P. Dais and A.Malliaris, Polymerization of Allyldimethyl-dodecylammonium Bromide in Micellar and Isotropic Media, J. Polym. Sci, Polym. Chem. Edit., **22**, 3383 (1984).

32. C. M. Paleos*, G. Margomenou - Leonidopoulou and A. Malliaris, The Effect of Functionalization on the Mesomorphic - like Character of some Quaternary Ammonium Salts, Chimica Chronica, New Series, **14**, 89 (1985).

33. A. Malliaris* and C. M. Paleos, Micellar Properties of Quaternary Ammonium Surfactants Bearing OH and COOH Functional Groups on their Ionic Heads, J. Colloid and Interface Sci., **101**, 364 (1984).

34. C. M. Paleos*, A.Vellios and D.Stathakos, Synthetic Amide -type Oligomers as Potential Carrier Ampholytes, Electrophoresis **82**, p.169, Walter de Gruyter and Co., Berlin, New York, (1983).

35. D. Babilis, P. Dais, L. H. Margaritis and C. M. Paleos*, Polymerization of Allyl and Diallyl Vesicle Forming Quaternary Ammonium Salts, J. Polym. Sci., Chem. Ed., **23**, 1089 (1985).

36. J. D. Anastassopoulou*, C. M. Paleos and N. Th. Rakintzis, The Behavior of 2,2,6,6 - Tetramethylpiperidine-1-oxyl (TEMPO) Irradiated in Aqueous Micellar Solutions of Cetyl Trimethylammonium Bromide (CTAB), Zeit. Phys. Chemie, Neue Folge, **141**, 59 (1984).

37. G. Margomenou-Leonidopoulou*, A. Malliaris and C. M. Paleos, Thermal Behavior of Some Long - chain Quaternary Ammonium Salts, Thermochimica Acta, **85**, 147 (1985).

38. C. M. Paleos*, G. Margomenou-Leonidopoulou, L. H. Margaritis and A. Terzis, Thermotropic - like Character and Vesicular Aggregation of N,N' Didodecyl Succinamic and Maleamic Acids, Mol. Cryst. Liq. Cryst., **129**, 127 (1985).

39. C. M. Paleos*, Polymerization in Organized Systems, Chem. Soc. Reviews, 45, (1985).

40. C. M. Paleos*, G. Margomenou - Leonidopoulou and C. Christias, Organizational Characteristics of Some Ionene Oligomers Bearing the Viologen Mesogenic Moiety, Mol. Cryst. Liq. Cryst., **137**, 391 (1986).

41. C. M. Paleos* and E. Papaconstantinou, Ascorbic Acid Reduction of 18 - Molybdodiphosphate in Micellar and Isotropic Media, J. Colloid. and Interface Sci., **113**, 297 (1987).

42. E. Papaconstantinou* and C. M. Paleos, A Comparative Reduction of 18-Molybdodiphosphate by a-Tocopherol in Micellar and Isotropic Media, Inorganica Chimica Acta, **125**, L5, (1985).

43. Κ. Μ. Παλαιός, Μονομερικά και Πολυμερισμένα Μικκυλιακά και Κυστιδιακά Συστήματα για τη Φωτοχημική Μετατροπή της Ηλιακής Ενέργειας, Χημικά Χρονικά, Γενική Εκδοση, 278 (1986).

44. D. Babilis, C. M. Paleos* and P. Dais, Polymerization of Oriented Monomers. IX. Further Studies on the Polymerization and Vesicular properties of Allyl and Diallyl Based Monomeric and Polymerized Quaternary Ammonium Salts. J. Polym. Sci. Chem. Ed., **26**, 2141 (1988).

45. A. Malliaris*, C. M. Paleos and P. Dais, Effect of Functionalization on Aggregational and Organizational Characteristics of the Sodium Salts of N-dodecyl Succinamic and Maleamic Acids, J. Phys. Chem., **91**, 1149 (1987).

46. C. M. Paleos*, G. Margomenou-Leonidopoulou, D. Babilis and C. Christias, Thermotropic Liquid Crystalline Character and Vesicular Properties of Some Functionalized Long-Chain Di-n-Dodecyl Quaternary Ammonium Salts, Mol. Cryst. Liq. Cryst., **146**, 121 (1987).

47. A. Malliaris* and C. M. Paleos, Polymerization in the Micellar State. Physicochemical Aspects, in "Surfactants in Solution", Vol. 9, 119 (1989), Edited by K.L. Mittal, Plenum Press, New York.

48. C. M. Paleos*, G. Margomenou-Leonidopoulou and A. Malliaris, Organizational and Aggregational Characteristics of Some Monomeric and Polymerized Quaternary Ammonium Salts, Mol. Cryst. Liq. Cryst., **161**, 385 (1988).

49. C. M. Paleos* G. Margomenou-Leonidopoulou, J. D. Anastassopoulou and E. Papaconstantinou, Novel Thermotropic Mesophase of Copper Complexes with Long-Chain Aliphatic Amines, Mol. Cryst. Liq. Cryst., **161**, 373 (1988).

50. C. M. Paleos*, A. Malliaris and P. Dais, Effect of the Position of the Double bond on the Polymerization of Micelle Forming Quaternary Ammonium Salts, Polymer Preprints, **28**, 434 (1987).

51. C. M. Paleos* and A. Malliaris, Polymerization of Micelle Forming Surfactants, J. of Macrom. Science, Reviews in Macromolecular Chemistry and Physics, **C28**, 403 (1988).

52. N. Mimicos, A. Mylona and C. M. Paleos*, Oxidation of Some Aliphatic Aldehydes in a Liquid-Liquid Interfacial System, Mol. Cryst. Liq. Cryst., **161**, 543 (1988).

53. C. M. Paleos*, D. Tsiourvas and P. Dais, Mesomorphic-like Character of Long-chain Amine Salts Formed by Template Neutralization on Polyacids, Liq. Cryst., **5**, 1747, (1989).

54. J. Michas, C. M. Paleos* and P. Dais, Polymerization of Head and Tail Micelle Forming Surfactants and Thermotropic Liquid Crystalline Character of these Monomers and their Polymers, Liq. Cryst., **5**, 1737, (1989).

55. D. Tsiourvas, C. M. Paleos* and P. Dais, Functionalized Polymers Derived from the Reaction of Polymaleic Anhydride with Amines and Alcohols J. Applied Polymer Sci., **38**, 257 (1989).

56. D. Tsiourvas, C. M. Paleos* and P. Dais, Further Studies on Homopolymers and Copolymers Resulting from the Reaction of Polymaleic Anhydride with Alcohols and Amines, J. Polym. Sci., Chem. Ed., **28**, 1262 (1990).

57. C. M. Paleos*, Polymerization of Monomeric to Polymeric Vesicles. Characterization and Applications, J. Macrom. Sci., Reviews in Macromolecular Chemistry and Physics. **C30**, (3+4), 379 (1990).

58. A. Kokkinia, C. M. Paleos* and P. Dais, Liquid Crystalline Character of Novel Main - Chain Polyphosphates Bearing Lipophilic and/or Mesogenic Moities, Polymer Preprints, **30**, 448 (1989).

59. C. M. Paleos*, J. Michas and A. Malliaris, Alkyl Derivatives of Iminodiacetic Acid: A Novel Class of Compounds Forming Thermotropic Liquid Crystals and Aqueous Micelles, Mol. Cryst. Liq. Cryst., **186**, 251 (1990).

60. A. Kokkinia, C. M. Paleos* and P. Dais, Liquid Crystalline Behavior of Some Bipolar Quaternary Ammonium Salts and Phosphate Amphiphiles, Mol. Cryst. Liq. Cryst., **186**, 239 (1990).

61. C. M. Paleos*, A. Kokkinia and P. Dais, Liquid Crystalline Character of Novel Main-Chain Oligophosphates Bearing Lipophilic and /or Mesogenic Moieties, Advances in Liquid Crystalline Polymers, ACS Symposium Series, No **435**, Chapter 7, 1990.

62. C. M. Paleos*, Stabilized Nanoparticles from Synthetic Polymerizable Micelles and Vesicles, in "Polymer Based Molecular Composites", Materials Society Publication, Symposium Proceedings, p 87, 1990.

63. D. Tsiourvas, C. M. Paleos and A. Malliaris*, Aggregation of Polyamphiphiles with the Polar Head on the Main Chain, Prog. Colloid and Polym. Sci., **84**, 86 (1991).

64. J. Michas and C. M. Paleos*, Mesomorphic Phases Obtained through Molecular Recognition of Complementary Adenine and Thymine Nucleobases Functionalized with Long Aliphatic Chains, Liq. Cryst., **11**, 773 (1992).

65. C. M. Paleos*, Polymerization of Micelle Forming Monomers, in "Polymerization in Organized Media" Editor: C. M. Paleos, Gordon and Breach Publishers, New York, Philadelphia, p. 183, 1992.

66. C. M. Paleos*, Polymerization in Vesicular Media, in " Polymerization in Organized Media", Editor: C. M. Paleos, Gordon and Breach Publishers, New York, Philadelphia, p. 283, 1992.

67. C. M. Paleos, D. Tsiourvas*, A. Malliaris, J. Anastassopoulou and Th.Theophanides, Physicochemical Characterization of Novel Polymeric Copper Complexes with Long-chain Aliphatic Diamines, NATO ASI Series, Editors: D. Salahub, N. Rousso, D. Reidel Publishing Co, Holland. p. 397 -1992.

68. G. Nika, C. M. Paleos*, P. Dais, A. Xenakis and A. Malliaris, Aggregational Behavior of Polymeric Micelles of Methacrylate Functionalized Quaternary Ammonium Salts, Prog. Colloid Polym. Sci., **89**, 122 (1992).

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72. C. M. Paleos*, D. Tsiourvas, J. Anastassopoulou and T. Theophanides, Supramolecular Structure of Certain Amphiphilic Liquid Crystalline Polymers, Polymer, **33**, 4047 (1992).

73. J. Michas, C. M. Paleos*, A. Skoulios and P. Weber, Thermotropic Liquid Crystals form Hydrogen-bonded Amphiphiles: N-alkyl-substituted Iminodiacetic Acids, Mol. Cryst. Liq. Cryst., **237**, 175 (1993).

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77. C. Sawas-Dimopoulou*, Z. Panagi, D. Ithakissios and C. M. Paleos, Preparation, Characterization and Biodistribution of a Mixed 131I-Hippuran Loaded Liposome System, Prog. Colloid Polym. Sci., **93**, 330 (1993).

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80. C. M. Paleos*, D. Tsiourvas, Thermotropic Liquid Crystals Formed by Intermolecular Hydrogen Bonding Interaction, Angew. Chem. Intern. Engl. Ed., **34**, 1696 (1995). (Review Article).

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86. M. Arkas, K. Yannakopoulou, C. M. Paleos, P. Weber,and A. Skoulios*, The Mesomorphic Behaviour of cyanopropylalkyldimethylammomium bromides, Liq. Cryst., **18**, 563-569 (1995).

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102. I. Tsogas, D. Tsiourvas, C. M. Paleos, S. Giatrellis and G. Nounessis, Interaction of L-Arginine with Dihexadecyl Phosphate Unilamellar Liposomes, COST D 27 Workshop on "Prebiotic Chemistry and Early Evolution", Heraclion, Crete, Sept. 30-Oct.3, 2004.

103. A. Pantos, D. Tsiourvas, Z. Sideratou, C. M. Paleos, S. Giatrellis and G. Nounessis, Characterization of Aggregates Originating from the Interaction of Complementary Liposomes, COST D 27 Workshop on "Prebiotic Chemistry and Early Evolution", Heraklion, Crete, Sept. 30-Oct.3, 2004.

104. T. Felekis, D. Tsiourvas and C. M. Paleos, Hydrogen-Bonded Dendritic Liquid Crystals, 2ο Συνέδριο Ελληνικής Κρυσταλλογραφικής Εταιρείας, ΕΚΕΦΕ Δημόκριτος, Οκτώβριος 2004.

105. C. M. Paleos and D. Tsiourvas, Molecular Recognition of Liposomes: Useful systems for studying cell interactions, COST D 31 Workshop on "Organizing Non-Covalent Chemical Systems with Selected Functions", Liege Belgium, March 21-22, 2005.

106. C. M. Paleos and D. Tsiourvas, Multicompartment systems originating from the Interaction of Complementary Liposomes, COST D 27, Workshop on "Prebiotic Chemistry and Early Evolution", Zagreb Croatia, May 20-21, 2005.

107. C. M. Paleos and D. Tsiourvas, Z. Sideratou, L. Tziveleka and C. Kontoyianni, Design and Synthesis of Multifunctional Dendritic Polymers as Prospected Drug and Gene Delivery Systems, Presented at "8th International Conference in Emerging Technologies in Drug and Gene-based Therapeutics", Crete, Greece, Sept. 3-10, 2005.

108. C. M. Paleos and D. Tsiourvas, Molecular Recognition of Liposomes: Multicompartment Systems Formation and Transport Phenomena, Presented at COST D 27, Workshop on "Chembiogenesis", Venice, Italy, Sept. 28-Oct.1, 2005.

109. C. M. Paleos and D. Tsiourvas, Z. Sideratou, Developing and Applying a Drug Delivery Model for Liposomal and Dendritic Multifunctional Nanoparticles, (Plenary Lecture) Presented at "9th International Conference in "Drug and Gene-based Therapeutics", Crete, Greece, Sept. 2-8, 2006.

110. L-A. Tziveleka, A-M. Psarra, Z. Sideratou and C. M. Paleos, Synthesis and Characterization of Functional Hyperbranched Polyether Polyols as Prospacted Gene Carriers. Presented at "9th International Conference in "Drug and Gene-based Therapeutics", Crete, Greece, Sept. 2-8, 2006.

111. C. M. Paleos, Multifunctional Liposomal and Dendritic Drug Delivery Systems, Presented at the Third International Greek Biotechnology Forum, Athens, October 5-7, 2006.

112. D. Tsiourvas and C. M. Paleos, "Liquid crystals derived from covalently and non-covalently functionalized dendritic polymers", Presented at Euroconference on dendrimer soft self-assempled systems, 17-21 May 2006, Obernai, France.

113. A. Pantos, D. Tsiourvas, Z. Sideratou and C. M. Paleos "Molecular Recognition and Polyvalency induce Interaction between Complementary Liposomes leading to Multicompartmentalization". Presented at COST D 27, Workshop on "Chembiogenesis", Barcelona Spain, Dec. 15-18, 2006.

114. I. Tsogas, D. Tsiourvas, G. Nounesis and C. M. Paleos "Modeling Cell Membrane Transport: Interaction of Guanidinylated Poly(propylene imine) Dendrimers with Phosphatidylcholine based Liposomes."Presented at COST D 27, Workshop on "Chembiogenesis", Barcelona Spain, Dec. 15-18, 2006.

115. I. Tsogas, T. A. Theodossiou, Z. Sideratou, D. Tsiourvas and C. M. Paleos, "Functional Poly(propylene imine) Dendrimer Internalization. Membrane Crossing in Liposomes and Cells." Presented at COST D 27, Workshop on "Chembiogenesis", Barcelona Spain, Dec. 15-18, 2006.

116. L.-A. Tziveleka, A.-M. Psarra., D. Tsiourvas and C. M. Paleos Guanidinium functionalized poly(propylene imine) dendrimers as gene delivery systems, Presented at COST D31, Workshop on "Organising Non-Covalent Chemical Systems with Selected Functions", Athens, Greece, March, 28-31, 2007.

117. A. Pantos, D. Tsiourvas, G, Nounesis, C. M. Paleos, Molecular Recognition of Guanidinylated Dendrimers with Complementary Multilamellar Liposomes, Presented at COST D31, Workshop on "Organising Non-Covalent Chemical Systems with Selected Functions", Athens, Greece, March, 28-31, 2007.

118. I. Tsogas, T. A. Theodosiou, Z. Sideratou, C. M. Paleos Transport of Dendrimers bearing Guanidinium surface groups through Liposomal Membranes, Presented at COST D31, Workshop on "Organising Non-Covalent Chemical Systems with Selected Functions", Athens, Greece, March, 28-31, 2007.

119. I. Tsogas, T. A. Theodossiou, Z. Sideratou, D. Tsiourvas, C. M. Paleos, H. Collet, J. C. Rossi, B. Romestand, A. Commeyras "Interaction and Transport of poly(L-Lysine) Dendrigrafts through Liposomal and Cellular Membranes: The Role of Generation and Surface Functionalization, Presented at 5th Interational Dendrimer Symposium, Toulouse, France, August 28- September 1, 2007.

120. C. M. Paleos, D. Tsiourvas, Z. Sideratou, L.-A. Tziveleka, Functional dendritic polymers as drug and gene delivery systems, presented at the International conference on Nanomedicine, Chalkidiki, Greece, September 9-11, 2007.

121. C. M. Paleos, D. Tsiourvas, Z. Sideratou, L.-A. Tziveleka, Multifunctional Dendritic Drug Delivery Systems: Design, Synthesis, Controlled and Triggered Release, Workshop on Solid Phase Phospholipid and Dendrimer Synthesis, Athens, Greece, December 3, 2007.(Invited Plenary Lecture).

122. C. M. Paleos, D. Tsiourvas, Z. Sideratou, T. A. Theodossiou, Modelling Cellular Membrane Transport: Interaction and Transport of Guanidinylated Dendritic Polymers through Liposomal Membranes, Presented at the ILS 2007 Annual Meeting, Liposome Advances (Progress in Drug and Vaccine Delivery, December 8-11, 2007.

123. Z. Sideratou, T. A. Theodossiou, D. Tsiourvas, M. Fardis and C. M. Paleos, "Multifunctional hyperbranched polymers with protective coating and targeting character as MRI

contrast agents", ESF Exploratory Workshop on "Hyperbranched polymers as novel materials for nanoscale applications: insight from experiment, theory and simulations (HYPER-NANO), Fodele, Grete, Greece, May 25-28, 2008.

124. C. M. Paleos, D. Tsiourvas, Z. Sideratou, L.A. Tziveleka, Targeted and Multifunctional Dendritic Polymers: Magic Bullets for Drug and Gene Delivery, Presented at Ehrlcich II, Second World Conference on Magic Bullets, Nuerberg, Germany, October 3-5, 2008.

125. S. Cohen, Z. Sideratou, C. M. Paleos and R.Korenstein "Uptake and Adsorption of Nano-carrier Based on PEGylated Hyperbranched Polyesters by Different Cell Lines" Fifth Workshop, The Center of Nanoscience and Nanotechnology, February 22-24, 2009, Tel Aviv University, Israel.

126. T A. Theodossiou, L.A. Tziveleka, Z. Sideratou, J. Tsogas, D. Tsiourvas and C. M. Paleos, The Adaptive Solubility Behaviour of Guanidinylated Dendritic Palymers Facilitates their Transport through Cells Membrane, Presented at the "Second European Conference for Clinical Nanomedicine, Basel Switzerland, April 27-29, 2009.

127. C. M. Paleos, D. Tsiourvas, Z. Sideratou, and A. Pantos, Guanidinium Group:A Group Inducing Membrane Transport and Multicompartment Systems Formation, Presented at "Chembiogenesis 2009" , COST ACTION CM0703, Lake Balaton, Hungary, 23-27 October 2009.

128. N. Sterioti, Z. Sideratou, D. Tsiourvas and C. M. Paleos, Synthesis and Characterization of Guanidinylated Poly(L-lysine) DendriGrafts as Prospective Insulin Delivery systems, Young Researchers' Technical Workshop in the frame of EuroNanoMedicine 2009, Bled, Slovenia, September 28, 2009.

129. C. M. Paleos, D. Tsiourvas, Z. Sideratou and A. Pantos, Liposomal Membrane Transport and Multicompartment Systems Formation Induced by Guanidinium Functionalized Dendritic Polymers and Liposomes Respectively, EUROBIC10, June 22-26, 2010, Thessaloniki, Greece.

130. S. Cohen, Z. Sideratou, C. M. Paleos, R. Korenstein, Evaluation of hyperbranched polyester as a drug carrier system for intestinal cells, 35th FEBS Congress, Molecules of Life, Gothenburg, Sweden, June 26 –July 1, 2010. Conference proceedings: FEBS JOURNAL, 277, Suppl. 1, p. 226, 2010.

131. C. M. Paleos, D. Tsiourvas, Z. Sideratou, Formation of Lipid-based Multicompartment Systems and a Hypothesis on the Creation of Eukaryotic Cells, CHEMBIOGENESIS, 2011, 27-30 October 2011, Heraklion, Greece.

D. INVENTION DISCLOSURES

These invention disclosures were submitted to NASA, USA and the Patent Office of STANDARD OIL COMPANY (IND), AMOCO CHEMICALS respectively. These inventions primarily deal with the development of modified polypropylene as well as polymer additives.

1. C. M. Paleos and M.M. Labes*, Production of Crystalline Polymers via Liquid Crystals Monomers. NASA TECH BRIEF 69 - 10774; December 1969. Labes, USA).

2. C.M. Paleos, Spin Labeling as a Method of Measuring Crystallinity in Polymers, May 1, 1970.

3. C. M. Paleos, J. L. Jezl and W. Poppe, Photostabilizers of the Benzophenone and Benzo-triazole Derivatives Containing Sulfonic Groups, May 8, 1970.

4. C. M. Paleos, Amine-type Non-leachable Antioxidants, May 8, 1970.

5. W. Poppe, C. M. Paleos and G. Gaspari, New Monomers for building Dyeability in Polypropylene through Grafting, June 2, 1970.

6. C. M. Paleos and W. Poppe, A new Dyeable Polypropylene System through Quaternary Base Formation of its Graft with 4-Vinylpyridine, June 23, 1970.

7. C. M. Paleos, W. Poppe and J.L. Jezl, Photostabilizers of the Scriff's Base Type, September 3, 1970.

8. C. M. Paleos and W. Poppe, A New Dyeable Polypropylene System: Graft Copolymers with t-butylaminoethylmethacrylate and Styrene, September 3, 1970.

9. W. Poppe and C. M. Paleos, A New Dyeable Polypropylene System: After-Treatment of Polypropylene-Styrene-Maleic Anhydride Graft Copolymers, October 12, 1970.

10. C. M. Paleos and W. Poppe, Treatment of Polypropylene-4-vinylpyridine Graft Copolymer Fibers with Dimethylsulfate to enhance Dyeability, October 12, 1970.

11. C. M. Paleos and W. Poppe, Quaternized Dyeable graft Copolymers of Polypropylene with Styrene and Dimethylaminoethylmethacrylate, November 3, 1970.

Annex 2

Indicative Comments to publications of C. M. Paleos

Comments	Index Number from the List of Publications
The polymerization of the molecular subunits has been **a major step in increasing control over the structural properties** of the polymolecular system (**Nobel Lecture, J. M. Lehn**, Angew. Chemie, **27,** 89, 1988).	39
Vesicles are of **special interest** in this respect, since **compartmentalization must have played a major role** in the self-organization of complex matter and thus the evolution of living cells and organisms. One may envisage the controlled build-up of architecturally organized and functionally integrated systems towards the design of **artificial cells and polyvesicular entities** of tissue-like character, ... (J. M. Lehn, Rep. Prog. Phys., **67,** 249, 2004).	119
Molecular recognition processes provide **a powerful tool** to induce **selective interaction** at the interface of vesicular membranes that may result in aggregation, adhesion, and fusion. The development of chemical liposomal systems undergoing such events provides approaches **to mimicking biomembrane and biological cellular processes** (J. M. Lehn, PNAS, **101,** 15279, 2004).	130
Review paper of **outstanding interest** (B. Donnio, Current Opinion in Colloid and Interface Science, **7,** 371, 2002).	118
……**excellent review** (Summers et al., Advances in Colloid and Interface Science, **100-102,** 137 (2003).	39
Review paper of **outstanding interest** (Baglioni., Current Opinion in Colloid and Interface Science, **8,** 55, 2003).	98

Nonetheless, structured assemblies of vesicles **will have great potential as biomaterials** since they can host integral membrane proteins (IMPs) and compartmentalize incompatible reagents (Liem et al., J. Am. Chem. Soc., **129,** 12080, 2007). 130, 147

The creation of vesicle assemblies **is of great current interest**, with both homogeneous vesicle assemblies and……. (Mart et al., J. Am. Chem. Soc., **128,** 14462, 2006). 130, 142

Paleos and coworkers have investigated the pH dependent inclusion and release of pyrene in quaternized poly(propylene imine) dendrimers. The terminal quaternary ammonium salt not only **enhances the water solubility of the dendrimer, but possess bactericidal, antifungal and antimicrobial properties.** Pyrene is released when the internal tertiary amines get protonated between pH 4-2. This release within a narrower pH region suggests these materials are **potential candidates for pH-sensitive controlled-release drug delivery applications**. (Patri et al., Current Opinion in Chemical Biology, 6, 466, 2002). 112

Paleos et al investigated the solubilization and release properties of functionalized PEGylated diaminobutane poly(propylene imine) (DAB) dendrimers using pyrene as probe. They also evaluated the incorporations in these dendrimers of betamethasone corticosteroids as active ingredients. In another study besides PEG chains, guanidinium units were incorporated into the periphery to DAB dendrimers **to make them useful for drug targeted delivery**. They found that these new dendrimers have **higher loading capacity for guest encapsulation**. (Fernandez et al., Supramolecular Chemistry, 18, 633, 2006). 121,133

One **clever example has been reported by Paleos et al,** who were able to release encapsulated pyrene molecules from the interior of the dendrimers by lowering the pH of the solution (Reinhoudt et al., Small, **1**, 852, 2005). 110

For an **excellent overview** on the matter discussed above as well as on the molecular recognition of other biomolecules at air-water interface see review of Paleos (H. Rosemeyer, Chemistry and Biodiversity, **2,** 977, 2005). 98

Smart or intelligent polymers are those able to respond to external stimuli such as, for example, pH, temperature, ionic strength, light, or magnetic field. These polymers **draw growing interest**, **both in academia and in industry, due to their range of possible practical applications. The examples of these applications include drug delivery**……(Szczubialka et al., Journal of Materials Science: Materials in Medicine, 14, 699, 2003). 112

Here the highlight is on lipid based systems since they are generally friendly towards biological membranes. In this context, in the past decade, it has been assessed that **molecular recognition can address the specific interaction required by a targeted delivery** (Angius et al., J. Phys. Condens. Matter, **18,** 2203, 2006). 90, 122,125

Paleos and coworkers have **conducted extensive studies** on the formation of vesicle aggregates and have produced large vesicle aggregates by mixing phosphate-lipid doped vesicles with guanidylated dendrimers or polyarginine, (Mart et al., Pharmaceutical Research, **26,** 1701, 2009). 142,154

Another area that **has attracted recent interest is the development of triggered release systems based on dendrimer carrier**. pH dependent release of pyrene has been demonstrated: incorporation of pyrene was favoured at high pH, but at low pH protonation of internal dendrimer amines occurred thus creating a polar environment, resulting in release (expulsion) of pyrene. Hydrophilic quaternary groups on the surface of poly(polypropyleneimine) dendrimers affect release over a narrower pH range and PEG chains **improved the biological properties** (Emanuele et al., Advanced Drug Delivery Reviews, **57,** 2147, 2005). 110, 112,133

The **detailed review of liquid crystalline phases** with intermolecular hydrogen bonds was presented by Paleos and Tsiourvas. (Paj et al, Journal of Molecular Structure, **700,** 191, 2004). 80,118

Although numerous supramolecular LC systems incorporating benzoic acid/pyridine complexes have been investigated, **there is only one report that describes the use of this interaction to generate supramolecular LC dendrimers**. In the reported case a cholesterol-based calamitic carboxylic acid was combined with polypropylene imine dendrimers. (Cook et al., Journal of Materials Chemistry, **15,** 1708, 2005). 118,134

Recently, acid and salt-triggered multifunctional poly(propylene imine) dendrimers have been offered as a **prospective drug delivery system employing poly(ethylene glycol) chains for stability and protection**, **as well as guanidinium groups for targeting.** The release of drugs is achieved through a change of pH. (K. Petrak, Drug Discovery Today, **10,** 1667, 2005). 133

Catanionic vesicles appeared as **fascinating** objects……They have been **intensively investigated due to their possible applications in medicine, biology and pharmacy**. Characterization of the ability of catanionic vesicles to encapsulate different types of probes is **important for their application as carrier of molecules.** (Segota et al., Advances in Colloid and Interface Science, **121**, 51, 2006). 142

Intelligent polymers, **and which respond to external and internal stimuli to change their shapes and aggregation forms, have attracted considerable attention** in recent years. Such polymers have a variety of applications in many fields, such as drug delivery……(Yoshida et al., Colloid Polym. Sci., **285**, 1287, 2007). 112

Synthetic vesicles, unlike naturally occurring systems, are metastable structures and tend to revert back to the lamellar phase by vesicle fusion or they precipitate out from an aqueous dispersion. **One of the best approaches to overcome this instability is to lock in these structures by use of polymerizable surfactants**. (Paul et al, Journal of Polymer Science, Part A: Polymer Chemistry, **42**, 5271, 2004). 66

A wide range of polyethylene glycol-derived materials and their analogs have been developed with **considerable interest in new architectures that may afford new and useful properties**. Particularly interesting in this regard are polyglycerol dendrimers, which have been explored as potential drug delivery agents (Elmer et al., Eur. J. Org. Chem, 3845, 2008). 145

We noticed in literature that a rapid growth of research on hyperbranched polymers containing peripheral amines has led to a variety of structurally intriguing materials having **eminent applications in many fields** such as biomedical applications (i.e. **the delivery of active pharmaceuticals, imaging agents or gene transfection**). (El-Shehawy et al., Reactive and Functional Polymers, **68,** 1682, 2008). 153

Complexation of anionic liposomes with polycations was intensively studied for synthetic and natural ones showing a strong tendency to 142

vesicle aggregation. This research **has revealed a variety of interesting observations** like transmembrane migration, reversible adsorption of the adsorbed polyelectrolyte molecules, etc. (Volodkin et al., Biochimica et Biophysica Acta, **1768,** 280, 2007).

Paper of **special interest** (S. Diele., Current Opinion in Colloid and Interface Science, **7,** 333, 2002). 114

Paper of **special interest** (M. Imperor- Clerc., Current Opinion in Colloid and Interface Science, **9,** 370, 2005). 114

The status of polymerization in liquid crystalline systems has been reviewed in three **comprehensive reports which discuss in depth** the evidence for monomer order and mobility effects on the polymerization rates. (C. E. Hoyle et al., Macromolecules, **26**, 758, 1993). 39

The advantages of such reactions in exhibiting control over the microstructure and molecular properties of the ultimate product **have been well documented** (G. Baskar, J. Am. Oil Chem. Soc., **76**, 853, 1999). 39

The **ascorbate reduction technique is widely used in nitroxide spin labeling** studies for the quantitative reduction of nitroxides which are accessible to the aqueous ascorbate solution (Keana et al, J. Am. Chem. Soc., **104,** 827, 1982). 14

The stability of organized assemblies is **critically important** and methods of stabilization have been developed by several workers. A **most useful extension of the work lies in the use of cross-linked polymerized assemblies, in particular as applied to vesicular systems** (Shirai et al, J. Polym. Sci. Pol. Chem. Ed., **23,** 463, 1985). 17

The literature in this area has been **aptly summarized** in three **excellent review papers** (E. Hoyle et al., Macromolecules, **28**, 1946, 1995). 39

Interaction of liposomes to each other and with macromolecules **attracts great attention because of the interest to simulate intercellular, polymer-cell and liposome cell interactions** (D. Volodkin et al., Biochim. Biophys. Acta, **1768**, 280, 2007). 130

Paleos et al. designed a double-hydrophilic hyperbranched multiarm copolymer with HPG core and partially folated PEG arms (**Figure 12**) and found such a folated HPG-star-PEG could be served as an **excellent unimolecular drug carrier with targeting ability** (Y. Zhou et al. Adv. Mater. **22,** 4567, 2010). 145

Paleos et al. designed guanidinylated PPI dendrimers which formed well characterized dendriplexes with plasmid DNA and **systematically displayed a structure-tranfection relationship with cytotoxicity.** The Paleos group has also **shed some light on the structure-membrane permeation rapport of such systems.** With hyperbranched dendritic systems they have prepared hyperbranched dendritic polyether polyols that were partially functionalized with quaternary or tertiary ammonium groups. The quaternized polyols showed **a superior transfectability of genetic material** over tertiary amine functionalized scaffold claimed from destabilization of the lysosomal membrane. (M. A. Quadir and R. Haag, Journal of Controlled Release, Macromolecules, **161**, 484, 2012) 151,152,154, 155,156

Paleos et al described **the novel** use of these C_8-or C_{18}-coated G4 and G5 PPIs with urea connectivity as **"nanosponges**," demonstrating their ability **to encapsulate polyaromatic hydrocarbons from water down to a few part per billion.**These authors further demonstrated that the triethoxysilyl functionalization of G4 PPI followed by its reaction with porous ceramic filters generated a covalently bonded organosilicon dendritic polymer that was capable to remove polycyclic aromatics from water at a few ppb by continuous filtration; The filter was **effectively regenerated** by treatment with MeCN (Newkome, et al., Polymer, **49,** 1, 2008). 128,141

Such binding versatility implies that dendrimers may act as a host for a variety of chemical species and **serve as a "nanosponge"** for the remediation of contaminated water… (P. Chen, et al., J. Phys. Chem. C, **115**, 12789, 2011). 128

For example, water insoluble organic compounds, e.g., pyrene and polycyclic aromatic hydrocarbons, **can be effectively encapsulated** inside the interior cavities of PPI and PAMAM dendrimers. (C.-C. Chu and T. Imae, Macromolecules, **42**, 2295, 2009). 128, 140,141

For example, Dr Sakar of MMIs and **a group of Greek researchers from the Institute of Physical Chemistry "Demokritos" in Attiki, Greece**, **independently demonstrated recently** that PAPAMOS and closely related poly(propyleneimine-organosilicon) coated clays, ceramics, and/or silica substrates **very effectively absorb and eliminate a variety of contaminants from water,** including polycyclic and monocyclic aromatics, trihalogen-methanes, pesticides, methyl isobutyl ether, and various heavy metals, and can then be **regenerated for repeated** use by simple washing with solvents, such as acetonitrile. (P. Dvornic., J. of Polymer Science, Part A, **44,** 2755, 2006). 141

These polymers allow for the extraction of toxic polycyclic aromatic compounds dissolved in water. Due to **highly selective hyperbranched nanosponges, the concentration of polycyclic aromatic hydrocarbons in water could be reduced to a few ppb**. Structural features such as symmetry of the polymers, flexibility of their branches, intermolecular interactions, and chemical moieties of the nanocavities are the parameters determining the xtraction/encapsulation capability. The extracted pollutants can be removed from the hyperbranched nanosponges by treating the saturated hyperbranched extraction medium with organic solvents (**regeneration of the hyperbranched polymer)**. (M. Seiler, Fluid Phase Equilibria, **241**, 155, 2006) 140

Annex 3

Brief Analysis of Scientific Work

The work towards my PhD degree was supervised by Prof. M. M. Labes, a pioneer in the field of liquid crystals, who introduced me to this field and specifically, into the topic of "Reactions in Thermotropic Liquid Crystalline Phases". The emphasis was placed on the polymerization in liquid crystalline phases and the effects of organization on reactivity and polymer morphology. The publications that originated from this pioneering work were among the first to appear in the literature and they were extensively cited.

In the 1970s, inspired by the polymerization in organized thermotropic liquid crystalline media, I extended my work to other organized media, investigating polymerizations and oxidations at liquid-liquid interfaces and polymerizations of monomers organized in micelles or liposomes. These molecular aggregates, i.e. the micelles and the liposomes, are organized supramolecular systems, resulting from the self-assembly of amphiphilic molecules. At that time they were characterized as colloidal systems, while now they are considered as nanoparticles due to their size. Therefore, colloid chemistry is bridged to the spectacularly advancing field of nanoscience. A great number of highly cited publications and critical reviews resulted from this work. Moreover, I was the editor of the book "Polymerization in Organized Media", Gordon and Breach Science Publishers, in which I also contributed with two of its seven chapters.

Early in the '80s, I introduced an innovative methodology for the preparation of liquid crystalline polymers by interacting reactive polymers with mesogenic molecules. The method proved to be convenient affording liquid crystalline polymers whose molecular weight and structure is affected by the original polymers. The relevant publications were extensively cited.

In 1982, I investigated thermotropic liquid crystals phases originating from amphiphilic molecules, which was an area neglected until that time. My first short note in Mol. Cryst. Liq. Cryst. kindled international interest for the preparation and characterization of this type of thermotropic liquid crystals. The detailed characterization of these liquid crystalline materials was initiated in Strasbourg (1991-92) during my visiting professorship in the University of Louis Pasteur and continued the following years through a fruitful collaboration with Dr A. Skoulios of CNRS. Numerous publications

resulted from this joint effort, both of original research and review type, triggering the interest for the synthesis of amphiphilic molecules, which self-assemble and organize forming thermotropic liquid crystals and lyotropic liquid crystals when dissolved in water.

Following the first publication on "Hydrogen-bonded Liquid Crystals" [(J. M. Lehn, ChemComm 1989), Nobel Laureate], I was one of the first researchers around the world to start investigating the preparation and characterization of this type of supramolecular liquid crystals resulting from the assembly of complementary molecules through hydrogen bonding. My seminal review article in Angew. Chem., 1995 is extensively cited while my recent review in Liquid Crystals, 2001 is also highly cited.

In the mid-1990s, I entered the field of dendritic nano-sized polymers and I am intensively continuing research on these polymers until today. Three types of nanomaterials are being prepared and characterized:

a. Liquid crystalline polymers based on symmetric dendrimers and non-symmetric hyperbranched polymers, providing a diversity of liquid crystalline phases. Relevant publications are extensively being cited.

b. Functional dendritic polymers form hybrid materials by intergrading these polymers with ceramics through covalent or non-covalent bonding. These materials act as "nanosponges" removing impurities from water under energy-saving conditions. Ultra-pure water is produced with its remaining impurities to the level of a few ppb, following filtration through these filtering modules. The latter are regenerated by washing with appropriate solvents. Patent applications in several countries were filed and patents granted while several publications followed.

c. Multifunctional dendritic derivatives are currently investigated by our group as drug delivery systems or transfection vectors for gene therapy in *in vitro* experiments. Patent applications in several countries were filed and patents granted while the results were disseminated by several publications. Experiments *in vivo* are planned in the near future.

My last two activities culminated in the establishment of a spin-off Company, "**DendriGen SA,**" for commercial exploitation of the developed nanoparticles.

Starting from 2000, I am involved in the development of multifunctional liposomes aiming at their application as drug delivery systems. Comparative evaluation of liposomes to dendritic multifunctional derivatives, as drug delivery systems, is being undertaken.

I have recently extended my activity from molecular recognition of complementary molecules to the recognition of self-assembled nanoparticles. Thus, I have investigated liposome-liposome and liposome-dendritic polymer interactions. I have studied in detail the mechanism of interaction of these nanoparticles aiming at modelling cell-cell and cell-drug interactions in drug delivery. These investigations were published and reviewed in several prestigious journals.

A significant outcome of the work dealing with liposome-liposome interaction led to proposing a working hypothesis regarding the origin of eukaryotes (Journal of Molecular Recognition 2007, Langmuir 2011). Thus, based on the results of complementary liposome interactions, it was hypothesized that eukaryotes which exhibit multicompartment character, may have originated from the symbiotic association of prokaryotes.

Transport through cell membrane is also a current major activity of our Laboratory. Dendritic polymers, have been multi-functionalized in order to exhibit typical characteristics of peptide molecular transporters, which effectively cross cell membranes. I proposed a transport mechanism and several publications in prestigious journals have resulted from this continuing effort.

During my long career at the Institute of Physical Chemistry, I was also involved in topics of conventional chemistry including synthetic and mechanistic organic chemistry, polymer modification, nitroxide spin-labeling chemistry etc before focusing to Nanochemistry and Supramolecular Chemistry. Details of this work are included in my publications.

I served for two periods (1994-1999 and 2001-2007) Director of the Institute of Physical Chemistry, of NCSR "Demokritos", which I reorganized, changing its priorities and establishing new areas of research. Specifically I established the Programs of *Environmental Science and Technology, Chemical biology and Molecular and Supramolecular Nanomaterials.*

The excellence coupled with productivity of my research activity is reflected in a great number of publications and patents. I authored 173 publications 155 of which are included in the Web of Science, which were cited 3.300 times in the period from 1970 to March 2013. Also, I supervised the completion of 13 PhD and 7 MSc Theses.