

# Constantinos G. Screttas

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## Curriculum Vitae – Current Research Interests

### Education and qualifications

1966: Ph.D. Chemistry, University of Tennessee

1961: M.S. Chemistry, Texas A and M University

1957: Diploma of Chemistry, University of Thessaloniki

### Appointments

1. Teaching Assistant (Texas A and M Univ.) 1 year
2. Research Chemist (Chemetron Corporation) 2.5 years
3. Research Chemist (Oak Ridge National Laboratory-University of Tennessee) 2.5 years
4. Acting Director of Organic Research (Lithium Corporation of America) 1.8 years
5. Group leader, Organometallic Chemistry from April 1968 till December 1994
5. Acting Director of IOPC, from December 1994 till February 1995
6. Director of IOPC from February 1995 till February 2000
7. Emeritus Research Director (from 2000)

### Research Interests

- Main Group (1A, 2A) Organometallic Chemistry.
- Alkali metal radical anions and dianions as homogeneous sources of alkali metals in organometallic synthesis, including solid state synthesis.
- Reagents and catalytic systems containing mixed 1A, 2A metal organics and alkoxides designed for controlling chemo- and regioselectivity in reactions such as carbon-lithium bond formation or alkylation by ethylene.
- Development of novel functionalized organolithium reagents with application to the synthesis of novel phosphorus ligands for transition metal catalysis, or to the synthesis of other functional materials e.g. NLO and NIR materials.
- Dendrimer chemistry.

## Publications

### Publications in refereed journals

1. C. G. Screttas and A. F. Isbell, *J. Org. Chem.*, **27**, 2573-2577 (1962). 'Utilization of Organolithium Compounds for the Preparation of Tertiary Phosphines, Phosphine Oxides and Phosphine Sulfides'.
2. C. G. Screttas, J. F. Eastham, *J. Am. Chem. Soc.*, **87**, 3276 (1965). "Alkyl-lithium-Amine Crystalline Complexes".
3. C. G. Screttas, J. F. Eastham, *J. Am. Chem. Soc.*, **88**, 5668 (1966). "Solvent Effects in Organometallic Reactions. Kinetic Role of Base".
4. C. G. Screttas, J.F. Eastham and C.W. Kamienski, *Chimia*, **24**, 109 (1970). "Selective Side Chain Lithiation of Toluene and Methyl-Pyridines".
5. C. G. Screttas, *J. Chem. Soc. D.*, 406 (1971). "Reaction of Butyl-lithium with Stable Free Radicals".
6. C. G. Screttas, *J. Chem. Soc. D.*, 752 (1972). "Stoichiometry and Synthetic Utility of the Reaction of Alkyl Halides with Lithium Dihydronaphthylides".
7. C. G. Screttas, *J. Chem. Soc. D.*, 869 (1972). "Metallation of Aryl Ethers by Lithium Arenes".
8. C. G. Screttas, *J. C. S. Perkin II*, 745 (1974). "On the Mechanism of Ring Metallation of Aromatic Compounds. Metallation of Thiophene by Lithium and by Lithium Dihydroarylides".
9. C. G. Screttas, *J. C. S. Perkin II*, 165 (1974). "Amphielectronic Ionization of a  $\pi$ -Radical, a Basis for Correlating Radical with Nucleophilic and/or Electrophilic Reactivities".
10. C. G. Screttas and D. G. Georgiou, *Tetrahedron Lett.*, 417 (1975). "Concentration and Substrate Dependent Reaction Mechanisms in the Metal Ketyl-Alkyl Halide System. Magnetochemical Zero-Order Kinetics as Evidence for Diamagnetic Reactive Species at High Ketyl Concentrations. Catalysis by Transition Metals".
11. M. Micha-Screttas and C.G. Screttas, *J. Org. Chem.*, **42**, 1462 (1977). "Preparation of Alkyl Phenyl Sulfides by Electrophilically Catalyzed displacement of Certain Nucleophiles by Thiophenoxy Group".
12. C. G. Screttas and C. T. Cazianis, *Tetrahedron*, **34**, 933 (1978). "Mechanism of Meerwein-Ponndorf-Verley Type Reactions".
13. C. G. Screttas and M. Micha-Screttas, *J. Org. Chem.*, **43**, 1064 (1978). "Hydrolithiation of  $\alpha$ -Olefins by a Regiospecific Two-Step Process. Transformation of Alkyl Phenyl Sulfides to Alkyl-lithium Reagents".
14. C. G. Screttas, *J. Org. Chem.*, **44**, 1471 (1979). "Could Ionization Potentials of Free Radicals Serve as Alkyl Inductive Substituent Constants?".
15. C. G. Screttas and M. Micha-Screttas, *J. Org. Chem.*, **44**, 713 (1979). "Markownikoff Two-Step Hydrolithiation of  $\alpha$ -Olefins. Transformation of

Secondary and Tertiary Alkyl Phenyl Sulfides to the Relevant Alkylolithium Reagents".

16. C. G. Screttas, *J. Org. Chem.*, *44*, 3322 (1979). "Correlation of Activation Energies with Taft's Alkyl Inductive Substituent Constant and its Implications to the Respective Steric Parameters. Dual Kinetic Parameter Relationships".
17. C. G. Screttas, *J. Org. Chem.*, *45*, 333 (1980). "Some Properties of Heterolytic Bond Dissociation Energies and their Use as Molecular Parameters for Rationalizing or Predicting Reactivity".
18. C. G. Screttas, *J. Org. Chem.*, *45*, 1620 (1980). "Equivalent or Alternative Forms of the Evans-Polanyi-Type Relations".
19. C. G. Screttas and M. Micha-Screttas, *J. Org. Chem.*, *46*, 993 (1981). "Structure of Radical Anions in Solution as Deduced from Paramagnetic Solvent Nuclear Magnetic Resonance Shift Measurements 1. Molar Paramagnetic Solvent Shifts as Molecular Parameters for Understanding in Ketyl Anion Solutions".
20. C. T. Cazianis and C. G. Screttas, *Tetrahedron*, *39*, 165 (1983). "Fluorenone Ketyl Anions Generated in Hydrocarbon Media by Phase Transfer Catalysis".
21. C. G. Screttas and M. Micha-Screttas, *J. Org. Chem.*, *47*, 3008 (1982). "Synthesis of Benzhydryl Ethers by a C-C Forming Reaction Using 2-Chloroethyl Ether. A Method for Attaching a Protected 2-Hydroxyethyl Group to a Benzylic Carbon".
22. C. G. Screttas and M. Micha-Screttas, *J. Org. Chem.*, *48*, 153 (1983). "Paramagnetic Solvent Nuclear Magnetic Resonance Shifts in Radical Anion Solutions 2. Some Cation Dependent Phenomena in Concentrated Solutions of Aromatic Hydrocarbon Radical".
23. C. G. Screttas and M. Micha-Screttas, *J. C. S. Chem. Commun.*, 1168 (1982). "Carbon-13 Contact Solvent Shifts in Radical Anion Solutions. Mechanism of Spin Density Transfer to Solvent".
24. C. G. Screttas and M. Micha-Screttas, *J. Org. Chem.*, *48*, 252 (1983). "Paramagnetic Solvent Nuclear Magnetic Resonance Shifts in Radical Anion Solutions 3. A Kinetic Method for Measuring Molar Paramagnetic Solvent Shifts of Unstable Radical Anions".
25. C. G. Screttas and M. Micha-Screttas, *J. Phys. Chem.*, *87*, 3844 (1983). "Paramagnetic Solvent NMR Shifts in Radical Anion Solutions. Carbon-13 Contact Shifts and Mechanism of Spin Density and / or Electron Transfer to Substrate".
26. C. G. Screttas and M. Micha-Screttas, *J. Organometal. Chem.*, *252*, 263, (1983). "Single-Titration Method for the Determination of Lithium Naphthalenide in Tetrahydrofuran".
27. C. G. Screttas, M. Micha-Screttas and C. T. Cazianis, *Tetrahedron Lett.*, *24*, 3287(1983). "The Benzilic Ester Rearrangement. Evidence for a SET Pathway in the Benzilic Ester and / or Acid Rearrangement".

28. C. G. Screttas and M. Micha-Screttas, *Organometallics*, *3*, 904 (1984). "Hydrocarbon-Soluble Organoalkali-Metal Reagents. Preparation of Aryl Derivatives".
29. C. G. Screttas and G. A. Heropoulos, *Tetrahedron*, *40*, 5275 (1985). "A Question Concerning the pK Range within which an Organic Free Radical Exhibits Normal Radical Behaviour. The Case of Galvinoxyl".
30. C. G. Screttas and M. Micha-Screttas, *J. Organomet. Chem.*, *290*, 1, (1985). "The Diphenylmagnesium / Alkali Metal Alkoxide System. Hydrocarbon Soluble-Organoalkali Metal Reagents".
31. C. G. Screttas and M. Micha-Screttas, *J. Organomet. Chem.*, *292*, 325 (1985). "Preparation of Solvated and / or Unsolvated Simple and Mixed Diarylmagnesiums".
32. C. G. Screttas and B. R. Steele, *J. Organomet. Chem.*, *317*, 137 (1986). "Formation of Ketones in the Reaction of Aldehydes with Unsolvated Dibutylmagnesium in Hydrocarbon Solvents under Homogeneous Conditions and its Implications".
33. C. G. Screttas and M. Micha-Screttas, *J. Organomet. Chem.*, *316*, 1, (1986). "Hexane-Soluble Complexes of Alkyl- and Alkenyl-Sodium Compounds with Magnesium Alkoxides".
34. C. G. Screttas and M. Micha-Screttas, *J. Am. Chem. Soc.*, *109*, 7573 (1987). "Radical Anions in Hydrocarbon Media. Interaction between Unsolvated and/or Solvated Radical Anions and Metal Alkoxides. Evidence for Cation-Dependent Clustering of Ketyl Anions at High Concentrations".
35. C. G. Screttas and I. C. Smonou, *J. Org. Chem.*, *53*, 893 (1988). "Ring Size Dependent Orientation in Dehydration of 1-[(Ethoxycarbonyl)methyl]-cycloalkanols".
36. C. G. Screttas and I. C. Smonou, *J. Organomet. Chem.*, *342*, 143 (1988). "Preparation of Allylic Lithium Reagents with the Allylic System Partly Incorporated into Carbocyclic Rings".
37. C. G. Screttas and B. R. Steele, *J. Org. Chem.*, *53*, 5151 (1988). "Carboxamidation of Organolithium and Organomagnesium Reagents by a Two-Step One-Flask Reaction. Promotion by Magnesium Alkoxides".
38. C. G. Screttas and B. R. Steele, *J. Org. Chem.*, *54*, 1013 (1989). "Metal Alkoxide Modified Organometallic Reagents. The Preparation and Stability of Organolithium Reagents in Tetrahydrofuran in the Presence of Magnesium 2-Ethoxy-ethoxide".
39. C. G. Screttas and M. Micha-Screttas, *J. Org. Chem.*, *54*, 5132 (1989). "Correlation of Thermochemical Data with Gas Phase Ionization Potentials".
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41. C. G. Screttas and G. A. Heropoulos, *Mag. Res. Chem.*, *28*, 878 (1990). "Molar Paramagnetic Solvent NMR Shifts of Galvinoxyl in Toluene. Kinetics of the Reaction Between Galvinoxyl and Tertiary Amines at High Radical Concentrations".
42. C. G. Screttas and M. Micha-Screttas, *J. Org. Chem.*, *56*, 1615 (1991). "Some Properties and Trends of Enthalpies of Vaporization and of Trouton's Ratios of Organic Compounds. Correlation of Enthalpies of Vaporization and of Enthalpies of Formation with Normal Boiling Points".
43. C. G. Screttas and M. Micha-Screttas, *Bull. Soc. Chim. Belg.*, *100*, 199 (1991). "Spectroscopic Electronegativities of Halogens and Interhalogens are Transferable and Additive Parameters. Examples of Correlations with Thermochemical and Nuclear Magnetic Resonance Spectroscopic Data".
44. C. G. Screttas and G. A. Heropoulos, *J. Polymer Chem., Section A.*, *30*, 1771 (1992). "Kinetic-Thermodynamic Evidence for the Involvement of SET steps in the Anionic Polymerization of Styrenes."
45. C. G. Screttas and G. A. Heropoulos, *J. Org. Chem.*, *58*, 1794 (1993). "Spectroscopic Electronegativities of Alkyl Groups. A Method for Estimating Ionization Potentials of Di- and Triradicals".
46. C. G. Screttas and G. A. Heropoulos, *J. Org. Chem.*, *58*, 3654 (1993). "Transferability-Additivity of Molar Volumes of Organic Liquids and their relation to Normal Boiling Points".
47. C. G. Screttas and B. R. Steele, *J. Organometal. Chem.*, *453*, 163 (1993). "Activated Alkyl- and Allyl-alkali Metal Reagents: Contrasting Behaviour towards Ethylene".
48. C. G. Screttas and G. A. Heropoulos, *J. Mol. Struct.*, *303*, 149 (1994). "Correlating Thermochemical Data with Molar Volumes. Toward Defining Chemical Space".
49. C. G. Screttas, G. I. Ioannou and D. G. Georgiou, *Russ. Chem. Bull.*, *1*, 83 (1995). "Stoichiometry and Mechanism of Diphenyl Ketyl Alkali Metal Protonation by Weak Proton Donors and their Relevance to the Base-Catalyzed Decomposition of Benzopinacol"
50. C. G. Screttas, G. I. Ioannou and M. Micha-Screttas, *J. Organometal. Chem.*, *511*, 217 (1996). "Stoichiometry of Protonation of Aromatic Hydrocarbon Radical Anions by Weak Proton Donors. A Marked Discrepancy Between the Number of Protons Used and those Incorporated into the Aromatic Structure"
51. C. G. Screttas, G. A. Heropoulos and B. R. Steele, *J. C. S. Faraday Trans.*, 1717 (1996). "Deviation from Trouton's Rule and a Method for Converting a Non-constitutive Molecular Parameter into a Constitutive One".

52. C. G. Screttas, M. Micha-Screttas and B. R. Steele, *J. Organomet. Chem.*, 536-7, 149 (1997). "The tert-Butyl Chloride-lithium Naphthalene Radical Anion and tert-Butyllithium-System. Mechanism of Metallation"
53. I. D. Kostas and C. G. Screttas, *J. Org. Chem.*, 62, 5575 (1997). "Synthesis and Applications of Tetrahydrofuran -Stable Substituted 3-(Lithioxyalkyl)- and 4-(Lithioxyalkyl)lithiums, Modified with Magnesium 2-Ethoxyethoxide"
54. I. D. Kostas, C. G. Screttas, C. P. Raptopoulou and A. Terzis, *Tetrahedron Lett.*, 38, 8761 (1997). "A Remarkable Tendency of o-Lithio-N-(2lithioxyethyl)-N-methyl)aniline to Form Heterocyclic Derivatives by its Reaction with Dichlorodialkylsilanes or Silicon Tetrachloride. Synthesis of 2,5,1-Benzoxazasilines and of the Silaspiro Analogue".
55. I. D. Kostas and C.G. Screttas, *Main Group Metal Chem.*, 20, 787-790 (1997). "Synthesis of Tetrahydrofuran-Stable  $\omega$ -Lithioxy-Azaalkyllithiums".
56. J. Andrieu, B. R. Steele, C. G. Screttas, C. J. Cardin and J. Fornies, *Organometallics*, 17, 839-845, (1998). "Synthesis of new phosphinoaminoalcohol ligands via ortho-alkyllithiation reactions. Versatile coordination behaviour towards Cu(I) and Pd(II)."
57. C. G. Screttas, G. A. Heropoulos, B. R. Steele and D. Bethel. *Mag. Res. Chem.*, 36, 656-662 (1998). "Phosphorus-31 contact shifts as a measure of weak ligand affinities. Interaction between alkali metal fluorenone radical anions and certain phosphorus (III and V) ligands."
58. A. Behrendt, C. G. Screttas, D. Bethell, O. Schiemann and B. R. Steele, *J. Chem. Soc., Perkin Trans. 2*, 2039, (1998). "Magnetic and Electrochemical investigations on anions derived from oligoketones containing fluorenone and benzophenone units. An approach to the design of stable multiradical organic materials."
59. I. D. Kostas, C. G. Screttas, *J. Organomet. Chem.*, 585, 1-6, (1999). "New rhodium complexes with P,N-ligands possessing a hydroxy or methoxy group. Synthesis, characterization and application to hydroformylation of styrene"
60. C. S. Salteris, I. D. Kostas, M. Micha-Screttas, G. A. Heropoulos, C. G. Screttas, A. Terzis, *J. Org. Chem.*, 64, 5589-5592, (1999). "ortho-Directed Lithiation of  $\omega$ -Phenoxyalcohols"
61. C. S. Salteris, I. D. Kostas, M. Micha-Screttas, G. A. Heropoulos, C. G. Screttas, A. Terzis, *Main Group Met. Chem.*, 22, 427-434, (1999). "ortho-Directed Lithiation of  $\omega$ -Phenoxyalkanethiols and N,N-Dimethyl,  $\omega$ -Phenoxyalkaneamines. Crystal Structure of Bis[o[(dimethylamino)ethoxy]phenyl]mercury"
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64. C. S. Salteris, I. D. Kostas, M. Micha-Screttas, G. A. Heropoulos, C. G. Screttas, A. Terzis, *J. Organomet. Chem.*, **590**, 63-70, (1999). "Synthesis of lithium  $\omega$ -(*m*- and *p*-lithiophenoxy)alkoxides modified with magnesium 2-ethoxyethoxide. Crystal structures of bis [4-(2-hydroxyethoxy) phenyl]mercury and bis[4-(3-hydroxypropoxy)phenyl]mercury"
65. B. R. Steele and C. G. Screttas, *J. Am. Chem. Soc.*, **122**, 2391-92, (2000). "A chemoselective catalytic side-chain alkylation of aromatics by ethylene leading to sterically demanding alkylbenzenes."
66. C. G. Screttas and B.R. Steele, *Appl. Organomet. Chem.* **14**, 653-659 (2000). "Mixed main group metal alkyls and alkoxides in synthesis and catalysis"
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68. M. Micha-Screttas, C. G. Screttas, B. R. Steele and G. A. Heropoulos, *Tetrahedron Lett.*, **43**, 4871-73 (2002). "Chemical and physical evidence for metal-metal interchange between lithium alkoxides and di-*n*-butylmagnesium"
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73. C. G. Screttas, G. A. Heropoulos, M. Micha-Screttas and B. R. Steele, *Tetrahedron Lett.* **46**, 4357 (2005). "Medium-dependent lithiated side products in the reductive lithiation of allylic phenyl thioethers. Diethyl ether versus tetrahydrofuran"

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75. A. G. Koutsimpelis, C. G. Screttas, O. Igglessi-Markopoulou, *Heterocycles*, **65**, 1393 (2005). "Synthesis of new ultraviolet light absorbers based on 2-aryl-2H-benzotriazoles"
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79. B. R. Steele, G. A. Heropoulos and C. G. Screttas, *Collect. Czech. Chem. Commun.*, **72**, 589-598 (2007). "Metal chloride reductions with aromatic radical anions. The magnesium chloride catalysed cleavage of tetrahydrofuran by sodium naphthalene radical anion"
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83. K. Gardikis, S. Hatziantoniou, M. Bucos, D. Fessas, M. Signorelli, T. Felekis, M. Zervou, C. G. Screttas, B. R. Steele, M. Ionov, M. Micha-Screttas, B. Klajnert, M. Bryszewska and C Demetzos, *J. Pharm. Sci.* **99**, 3561-3571 (2010). "New drug delivery nanosystem combining liposomal and dendrimeric technology (liposomal locked-in dendrimers) for cancer therapy"
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neuroprotective activity and devoid of interference with estrogen and aryl hydrocarbon receptor-mediated transcription."

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#### Patents

86. C. G. Screttas, U.S. Patent 3, 468, 970 (Sept. 1969); *Chemical Abstracts*, **71**, 123879s (1969). "Method of Carrying out Telomerization Reactions".
87. C. G. Screttas, U.S. patent 3, 691, 174 (1972): Fr. 1, 585, 022 (Jan. 1970). *Chemical Abstracts*, 130895p (1970). "Attaching a Metal to an Alkyl Side-chain of Pyridine, Quinoline and Isoquinoline".
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91. C. G. Screttas, U.S. Patent 3, 639, 380 (Feb. 1972); *Chemical Abstracts*, **76**, 141515c (1972). Preparation of Microcrystalline Waxes by Catalytic Telomerization of ethylene".
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93. C. G. Screttas, U.S. patent 3, 932, 545 (Jan. 1976); *Chemical Abstracts*, **85**, 33177w (1976). "Alkali Metal-Containing Organometallic Products".

#### Book

Perspectives in Organometallic Chemistry", ed. C.G. Screttas and B.R. Steele, Royal Society of Chemistry, Cambridge, **2003**.