

RONALD W. GUMBS

Education *Ph.D.*, Chemistry, 1969, SUNY College of Environmental Science and Forestry; Dissertation on “Cationic Polymerization of N-vinylcarbazole” Research Professor: Michael Szwarc
M.S., Chemistry, 1965, Polytechnic University; Thesis on “Cyclopolymerization” Research Professor: Herman F. Mark
B.S., Chemistry, 1962, Brooklyn College, City University of New York

Experience RWG Corporation 6/2003 to Present CEO & Chief Scientist
Conceived and founded an intellectual property development company with the sole purpose of selling or licensing new technologies.

Gumbs Associates, Inc. 2/73 to 6/2007 President
Developed: dental and medical polymers; heat resistant plastics; coatings and adhesives; encapsulants for silicon solar cells; thin film laminates for solar energy applications; thermoplastic composites for primary structures; and conductive polymers for radar and thermal signature suppression.

Yulex Corp. 11/2001 to Present Consultant

NJIT Enterprise Development Center 6/87 to 12/1997 Advisory Board Member

Summer Institute in Polymer Science and Technology at SUNY New Palz, 5/79 to 6/79 Instructor

Medgar Evers University, CUNY 2/73 to 6/73 Adjunct Asst. Professor, Chemistry Department

Borden Chemical 4/69 to 2/73 Group Leader
Supervised synthesis of wet and dry strength resins for paper; non-aqueous dispersions; conductive polymers; and solventless coatings and inks.
4/70 to 2/73 Safety Coordinator

Resin Research Laboratories 6/62 to 9/65 Chemist
Conducted R&D on various polymeric materials and composites, e.g. 10% polyethylene and cellulose. The scrap cartons or broke were shredded, micronized, blended with poly (vinyl chloride) on a Two-Roll Rubber and Plastics Mill, pelletized, and extruded into architectural moldings and siding.

Memberships: American Chemical Society; Division of Polymer Chemistry;
Division of Polymeric Materials;
ASTM Committee C09 on Concrete and Concrete Aggregates.

Publications

1. R. Gumbs, S. Penczek, J. Jagur-Grodzinski and M. Szwarc, "Simultaneous Cationic Homopolymerizations of Vinylcarbazole and Oxetane", *Macromolecules* 2, 77-82 (1969)
2. D.F. Paul and R.W. Gumbs, "Solar Energy Collector Coatings from Cyclopolymers of Butadiene and Acrylonitrile", *J. Appl. Polymer Science* 21, 959 (1976).
3. P. Chandrasekhar, A.M. Masulaitis and R.W. Gumbs, "Novel Synthesis, Spectroelectrochemical, Electrochemical and Chronovoltabsorptometric Characterization of Poly(Isothianaphthene)," *Synth. Met.* 36, 303-326 (1990).
4. P. Chandrasekhar and R.W. Gumbs, "Electrosyntheses, Spectroelectrochemical, Electrochemical, and Chronovoltabsorptometric Properties of Family of Poly(Aromatic Amines), Novel Processible Conducting Polymers: I. Poly(Benzidines)", *J. Electrochemical Soc.*, 138, No. 5, 1337-1346 (1991).
5. G.V. Kulkarni, P. Chandrasekhar and R.W. Gumbs, "Electronic Structure of Conducting Polymers," Poster Paper A-5 presented at Gordon Research Conference on Polymers, Wolfeboro, NH, June 24-28, 1991.
6. R.W. Gumbs, "Synthesis of Electrically Conductive Vinyl Copolymers," *Synth. Met.*, 64, No. 1, 27-31 (1994).
7. Y. Wei, J.M. Yeh, D. Jin, X. Jia, J. Wang, G.W. Jang, C. Chen and R.W. Gumbs, "Composites of Electronically Conductive Polyaniline with Polyacrylate-Silica Hybrid Sol-Gel Materials", *Chemistry of Materials*, 7, No. 5, 969 (1995).
8. G.W. Jang, C. Chen, R.W. Gumbs, Y. Wei and J.M. Yeh, "Large-Area Electrochromic Coatings. Composites of Polyaniline and Polyacrylate-Silica Hybrid Sol-Gel Materials", *J. Electrochem. Soc.*, 143, No. 8, 2591 (1996).
9. R.W. Gumbs, "Polythiophene and Polypyrrole Copolymers", in *Handbook of Organic Conductive Molecules and Polymers: Vol. 2, Conductive Polymers: Synthesis and Electrical Properties*, edited by H.S. Nalwa, John Wiley & Sons, New York, 1997, pp. 469-504.
10. Ronald W. Gumbs, "Conducting Polymers," in *Encyclopedia of Chemical Processing*, edited by Sunggyu Lee, Marcel Dekker, New York, 2006, pp. 526-537.

Patents

1. M.F. Carty, M.R. Dock, C.P. West, P. Esemplare and R. Gumbs, "Microfilter for Tobacco Smoke", *Fr. Pat.* 1,484,033, 9 June, 1967.
2. Samuel J. Makower, Ronald W. Gumbs, and Dickstein, Jack, "Cellulose Substantive Wet-Strength Latexes," *Canadian Pat.* 997,091, 14 September, 1976, assigned to Borden Inc.
3. R. W. Gumbs, "Nonlinear Optical Shield," *U.S. Pat.* 5,173,811, 22 December 1992.
4. P.E. Esemplare and R.W. Gumbs, "Hot Melt Adhesive Composition that Melts at Relatively Low Temperatures," *U.S. Pat.* 5,326,413, 5 July 1994.
5. Gumbs, Ronald W.; "Guayule Rubber and Resin Wet-Stick Bioadhesives," *U.S. Patent Application* (filed).
6. Gumbs, Ronald W.; *Utility Patent Application for "Guayule Resin Multipolymer"* Filing Date: October 16, 2007, Serial No. 11/873,013.

Current and Pending Support

1. USDA Phase I Pending Proposal, \$80,000, 05/01/2008 – 12/31/2008, 50%, Novel Wood Rubber Composites.
2. USDA Phase I Pending Proposal, \$80, 000, 05/01/2008 – 12/31/2008, 50%, Animal Manure Rubber Composites
3. AF Phase I Pending Proposal F073-095-1589, \$99,999, 03/01/2008 – 10/31/2008, 45%, Perfluorinated Polyimide-fluorosilicone Copolymer Adhesives for Solar Cell Coverglass.
4. DOE Pending Proposal, \$100,000, 05/01/2008 – 12/31/2008, 30%, Stabilization of Gypsum with Rubber.
5. DOE Pending Proposal, \$100,000, 05/01/2008 – 12/31/2008, 30%, Encapsulant for Broadband Multijunction Solar Cells.

Contract and Grants

1. Title: Polymer Laminates for Solar Energy Applications
Contract No: DE-AC01-83ER80052
Awarding Agency: U.S. Department of Energy
Award Amount: \$48,033
Date of Award: 09/01/83
Topic: Transparent Solar Materials
Principal Investigator: Ronald W. Gumbs
2. Title: Improved Dental Composite Filling Materials
Grant No: 1R43DE07050-01
Awarding Agency: National Institute of Dental Research
Award Amount: \$41,520
Date of Award: 09/24/84
Topic: Restorative Materials
Principal Investigator: Ronald W. Gumbs
3. Title: Development of Novel Silicone and Silicone-imide Copolymers for Solar Cell Encapsulation
Contract No: NAS7-930
Awarding Agency: NASA-Jet Propulsion Laboratory
Award Amount: \$49,400
Date of Award: 09/28/84
Topic: Photovoltaic Arrays
Principal Investigator: Ronald W. Gumbs
4. Title: Improved Thermoplastic Matrix for Composite Primary Structures
Contract No: DAAJ02-85-C-0018
Awarding Agency: U.S. Army Applied Technology Laboratory
Award Amount: \$92,840

- Date of Award: 06/25/85
 Topic: Improved Thermoplastic Matrix for Composite Primary Structures
 Principal Investigator: Ronald W. Gumbs
5. Title: Research in Eye Protection I
 Contract No: DAMD17-86-C-6186
 Awarding Agency: U.S. Army Medical Research Acquisition Activity
 Award Amount: \$50,560
 Date of Award: 12/12/85
 Topic: Research in Eye Protection
 Principal Investigator: Ronald W. Gumbs
6. Title: New Restorative Dental Resins
 Grant No: 1R43DE07532-01
 Awarding Agency: National Institute of Dental Research
 Award Amount: \$37,404
 Date of Award: 02/01/86
 Topic: Restorative Materials
 Principal Investigator: Ronald W. Gumbs
7. Title: Tough High Modulus Epoxy Casting Materials
 Contract No: N00167-87-C-0046
 Awarding Agency: David Taylor Naval Ship R&D Center
 Award Amount: \$49,830
 Date of Award: 06/02/87
 Topic: Tough High Modulus Casting Plastics
 Principal Investigator: Ronald W. Gumbs
8. Title: Ocular Shields for Protection against Laser Radiation and Ballistic Fragments
 Contract No: DAMD17-88-C-8195
 Awarding Agency: U.S. Army Medical Research Acquisition Activity
 Award Amount: \$50,000
 Date of Award: 08/15/88
 Topic: Ocular Protection from Laser hazards
 Principal Investigator: Ronald W. Gumbs
9. Title: Infra-red and Radar Suppressive Coatings
 Contract No: DAAH01-88-C-0839
 Awarding Agency: U.S. Army Missile Command
 Award Amount: \$49,075
 Date of Award: 09/15/88
 Topic: Low Observable Technology for Infrared Suppression
 Principal Investigator: Ronald W. Gumbs

10. Title: Biocompatible Adhesives
Contract No: DAMD17-90-C-0080
Awarding Agency: U.S. Army Institute of Dental Research
Award Amount: \$50,000
Date of Award: 03/30/90
Topic: Biologically Compatible Adhesives
Principal Investigator: Ronald W. Gumbs
11. Title: Electronics Encapsulation Using Conducting Polymer Coatings
Contract No: DAAA21-90-C-0086
Awarding Agency: U.S. Army AMCCOM
Award Amount: \$50,000
Date of Award: 08/13/90
Topic: Electronics Encapsulation Materials/Methods
Incorporating Electronic Shielding
Principal Investigator: Ronald W. Gumbs
12. Title: Conductive Paints Based on Soluble Conducting Polymers
Contract No: NAS10-11753
Awarding Agency: NASA-Kennedy
Award Amount: \$50,000
Date of Award: 01/04/91
Topic: Special Purpose Materials, Processes, and Testing for Space
Flight Applications
Principal Investigator: Ronald W. Gumbs
13. Title: Antifouling Coatings Based on Copolymers of Silicones and
Fluoropolymers
Contract No: DAAH01-91-C-R069
Awarding Agency: U.S. Army Missile Command
Award Amount: \$48,726
Date of Award: 02/28/91
Topic: Advanced Fouling Control Coatings
Principal Investigator: Ronald W. Gumbs

14. Title: Stabilization of Sulfur by Copolymerization with Guayule Resin
Grant No: 91-33610-6003
Awarding Agency: U.S. Department of Agriculture
Award Amount: \$50,000
Date of Award: 05/15/91
Topic: Industrial Applications
Principal Investigator: Ronald W. Gumbs
15. Title: Flexible EMI Shielding Materials Using Conducting Copolymers
Contract No: DAAK60-93-C-0008
Awarding Agency: U.S. Army Natick Research, Development and Engineering Center
Award Amount: \$49,176
Date of Award: 02/18/93
Topic: Development of flexible EMI Shielding Materials
Principal Investigator: Ronald W. Gumbs
16. Title: Novel Acrylic Starch Adhesives
Contract No: 99-33610-7434
Awarding Agency: U.S. Department of Agriculture
Award Amount: \$65,000
Date of Award: 05/10/99
Topic: Industrial Applications
Principal Investigator: Ronald W. Gumbs
17. Title: Solventless Adhesive Systems
Contract No: 68-D-99-051
Awarding Agency: U.S. Environmental Protection Agency
Award Amount: \$70,000
Date of Award: 07/16/99
Topic: Pollution Prevention and Clean Technologies
Principal Investigator: Ronald W. Gumbs
18. Title: Low-Cost Strippable Fixatives
Contract No: DE-FG02-03ER83670
Awarding Agency: U.S. Department of Energy
Award Amount: \$100,000
Date of Award: 05/30/2003
Topic: Control of Radiological Contamination
Principal Investigator: Ronald W. Gumbs

19. Title: Low-Cost Solventless Guayule Resin Adhesives
Contract No: 2004-33610-14337
Awarding Agency: U.S. Department of Agriculture
Award Amount: \$80,000
Date of Award: 05/15/2004
Topic: Industrial Applications
Principal Investigator: Ronald W. Gumbs
20. Title: Thin, Strippable Coatings for Wide-Area Toxic Industrial
Chemicals Neutralization
Contract No: NBCHC050013
Awarding Agency: Department of Homeland Security
Award Amount: \$100,000
Date of Award: 10/01/2004
Topic: Wide-Area Toxic Industrial Chemicals Neutralization
Principal Investigator: Ronald W. Gumbs
21. Title: Research in Eye Protection II
Contract No: DAMD17-86-C-6186
Awarding Agency: U.S. Army Medical Research Acquisition Activity
Award Amount: \$472,013
Date of Award: 02/15/87
Topic: Research in Eye Protection
Principal Investigator: Ronald W. Gumbs
22. Title: Electronics Encapsulation Using Conducting Polymer
Coatings
Contract No: DAAA21-93-C-0083
Awarding Agency: U.S. Army AMCCOM
Award Amount: \$368,875
Date of Award: 07/28/93
Topic: Electronics Encapsulation Materials/Methods Incorporating
Electronic Shielding
Principal Investigator: Ronald W. Gumbs