Professor Mohamad Al-Sheikhly

1. PERSONAL INFORMATION

1981 Ph.D. University of Newcastle Upon Tyne, England, United Kingdom

Academic and Research Positions

2005-present **Professor**

- Director of Radiation Research Facilities,
- Department of Materials Science and Engineering, University of Maryland
- Affiliate Faculty, Department of Chemical and Biomolecular Engineering
- **Professor**, Department of Bioengineering, University of Maryland

1999-2005: Associate Professor

1997- 1999: Assistant Professor
Director of Radiation Research Facilities
Department of Materials and Nuclear Engineering, University of Maryland

1993-1997: Adjunct Associate Professor, Department of Materials and
Nuclear Engineering, University of Maryland

1984-present: Guest Scientist, National Institute of Standards and Technology (NIST), Ionizing Radiation Division, Gaithersburg, MD

1999-2002 Guest Research Professor, Radiation Applications Research Centre, Beijing, P. R. China

1991-1993 Lecturer, Department of Materials and Nuclear Engineering, University of Maryland

1981-1984 Research Fellow, Max-Planck Institut für Strahlenchemie, Mülheim, a.d. Ruhr, Germany

2. RESEARCH, SCHOLARLY AND CREATIVE ACTIVITIES

a. Chapters in Books

1. M. Al-Sheikhly and M. G. Simic, “Inhibition of Autoxidation by Vitamin E and Bilirubin”, in “Anticarcinogenesis and Radiation Protection”, P. A. Cerutti, O. F. Nygaard and M. G. Simic, Editors, 47-50, Plenum Press, New York and London (1987).

2. M. Al-Sheikhly and M. G. Simic, “Oxygen Uptake in Characterization of Autoxidation and Antioxidation Processes”, in “Free Radicals: A Search for New Methodology”, C. Rice-Evans and B. Halliwell, Editors, Richelieu Press, 481-497 (1988).

3 W. L. McLaughlin, D. F. Lewis, M. Al-Sheikhly, A. Kovacs, and L. Wojnarovits, “A Radiochromic Solid -State Polymerization Reaction”, in “Irradiation of Polymers: Fundamentals and Technological Applications”, Clough and Shalaby, Editors, 152-166 (1996).

4. M. Al-Sheikhly and W. L. McLaughlin, “Interpenetrating Polymer Networks Formation by Electron Beam Curing of Acrylated Epoxy Resin Blends”, in “Irradiation of Polymers: Fundamentals and Technological Applications”, Clough and Shalaby, Editors, 188-196 (1996).

5. M. Chaychian, M. Al-Sheikhly, J. Silverman, and W. L. McLaughlin, “The Removal of Heavy Metal Ions by E-Beam Radiation), in “Environment Applications of Ionizing Radiation”, W. J. Cooper, R. Curry, and K. O’Shea, Editors, Publisher: Wiley Intersciences, 354-367 (1998).

6. Marina Chumakov and Mohamad Al-Sheikhly” Electron Beam-curing for a coating Applications”, in “High Energy Crosslinking Polymerization”, Xavier Coqueret and Brigitte Defoort, Editors, Publisher: Wiley-VCH (2009). **In press.**

b. Article in Book

1. M. Al-Sheikhly and M. G Simic, “Superoxide Radical Generation in Radiation Induced Autoxidation of Fatty Acids”, published in Superoxide and Superoxide Dismutase in Chemistry, Biology and Medicine”, G. Rotilio, Editor, 32-34, Elsevier Science Publishers, Amsterdam, N.Y., Oxford (1986).

c. Articles in Refereed Journals

Publications Prior to UMD Affiliation

1. M. Al-Sheikhly and C. von Sonntag, “Gamma-Radiolysis of 1.3-Dimethyluracil in N_2O-Saturated Solutions”, Z. Naturforsch. 38b, 1622-1629 (1983).

2. M. Al-Sheikhly, A. Hissung, H.P. Schuchmann, M. N. Schuchmann, C. von Sonntag, A. Garner and G. Scholes, “Radiolysis of Dihyrouracil and Dihydrothymine in Aqueous Solution Containing Oxygen; First- and Second-order Reactions of the Organic Peroxyl Radicals; the Role of Isopyrimidines as Intermediates”, Journal of Chemical Society, Perkin Trans. II, 601-608 (1984).

3. M. N. Schuchmann, M. Al-Sheikhly, C. von Sonntag, A. Garner and G. Scholes, “The Kinetics of the Rearrangement of Some Isopyrimidines to Pyrimidines Studies by Pulse Radiolysis”, Journal of Chemical Society, Perkin Trans. II, 1777-1780 (1984).

4. M. Al-Sheikhly, P. Schuchmannn, and C. von Sonntag, “Gamma-Radiolysis of N_2O-Saturated Formate Solutions. A Chain Reaction”, International Journal of Radiation Biology, 47, 457-462 (1985).

5. M. Al-Sheikhly, M. H. Hussman and W. L. McLaughlin, “Dichromate Dosimetry-The Effect of Acetic Acid on the Radiolytic Reduction Yield”, Radiation Physics and Chemistry, 32 545-551 (1988).

6. W. L. McLaughlin, H. M. Khan, W. Warasawas, M. Al-Sheikhly and B. B. Radak, “Optical Waveguide Dosimetry for Gamma-Radiation in the Dose Range 10^{-1}-10^{4} Gy,” Radiation Physics and Chemistry, 33, 39-46 (1989).

7. M. Al-Sheikhly and M.G. Simic, “Chain-Propagation Length of Linoleic Acid Peroxidation in Aqueous Monomeric and Micellar Systems”, Journal of Physical Chemistry, 93, 3103-3106 (1989).

8. M. Al-Sheikhly, M. G. Simic and S. V. Jovanovic, “Heterocyclic Resonant Radicals”, Free Radical Research, 6, 113-115 (1989).

9. M. Al-Sheikhly, W. L. McLaughlin, M. Farahani and M. H. Hussmann “A Sensitive Dichromate Dosimeter for Dose Range, 0.2-3 kGy,” Radiation Physics and Chemistry, 35, 716-723 (1990).

10. M. Al-Sheikhly and W. L. McLaughlin, “The Mechanisms of the Reduction Reactions of Cr (VI) in the Radiolysis of Acidic Potassium and Silver Dichromate Solutions in the Presence or Absence of Acetic Acid”, Radiation Physics and Chemistry, 38, 203-211 (1991).

11. F. Tang, M. Al-Sheikhly and J. Silverman, "The Effects of Small Concentrations of Methanol on the Radiation Polymerization of Styrene", Radiation Physics and Chemistry 7, 219-25 (1991).

12. M. Al-Sheikhly, M. Farahani and R. L. Bowen, "Polymerization Initiation by N-P-Tolyglycine: Free Radical Reactions Studied by Pulse and Steady State Radiolysis", Applied Polymer Science, 54, 1049-1058 (1994).

Publications from the University of Maryland

13. M. Al-Sheikhly*, "The Reactivity of Adenyl and Guanyl Radicals Towards Oxygen", Radiation Physics and Chemistry 44, 297-301 (1994).

14. M. Al-Sheikhly* and A. Christou, "How Radiation Affects Polymeric Materials", IEEE Transactions on Reliability, 43, 551-556 (1994).

15. M. Farahani, M. Al-Sheikhly* and R. Bowen, "N-P-Tolylglycine Free Radical Reactions- A Pulse Radiolysis Study", Journal of Dental Research, 73, 277 (1994).

16. N. B. El-Assy, Chen Yun-dong**, M. Al-Sheikhly*and W. L. McLaughlin "Anionic Triphenylmethane Dye Solutions for Low-Dose Food Irradiation Dosimetry", Radiation Physics and Chemistry 46, 1189 -1197 (1995).

17. A. Kovacs, L. Wojnarovits, N. B. El-Assy, H. Y. Afeefy, M. Al-Sheikhly, W. L. McLaughlin "Alcohol Solutions of Triphenyl Tetrazolium Salts As High-Dose Radiochromic Dosimeters", Radiation Physics and Chemistry 46,1217-1225 (1995).

18. M. Al-Sheikhly* and W. L. McLaughlin "On the Mechanisms of Ionizing Radiation Curing of Epoxide-Carbon Fiber Composite", Radiation Physics and Chemistry, 48, 201-206 (1996).

19. W. L. McLaughlin, J. M. Puhl, M. Al-Sheikhly, A. Christou, A. Miller, A. Kovacs, L. Wojnarovits, and D. F. Lewis, "Novel Radiochromic Films Clinical Dosimetry", **Best Paper Award**, Int'l Conf. of High Dose Dosimetry, Budapest, Hungary, July 1995. Published in Radiation Protection Dosimetry, 66, 263-268 (1996).

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** Al-Sheikhly's Student

20. M. Al-Sheikhly*, J. Silverman, P. Neta, and L. Karam, "On the Mechanisms of Ionizing Radiation - Induced Destruction of 2, 2 - Dichlorobiphenyl in Aqueous Solutions", Environmental Science and Technology, 31, 2473-2477 (1997).

21. D. C. Schmelling***, M. Chaychian**, J. Silverman, M. Al-Sheikhly*, D. L. Poster and P. Neta, "Degradation of Polychlorinated Biphenyls Induced by Ionizing Radiation in Aqueous Micellar Systems", Environmental Science and Technology, 32, 270-275 (1998).

22. M. Chaychian, M. Al-Sheikhly* J. Silverman, and W. L. McLaughlin, "The Mechanisms of Removal of Heavy Metal Ions from Water by Ionizing Radiation", Radiation Physics and Chemistry, 53, 145-150 (1998).

23. D. C. Schmelling***, M. Chaychian**, J. Silverman, M. Al-Sheikhly*, D. L. Poster, and P. Neta, "Applications of Ionizing Radiation to the Remediation of Materials Contaminated with Heavy Metals and Polychlorinated Biphenyls ", Radiation Physics and Chemistry, 52, 371-377 (1998).

24. K. Kovacs, L, Wojnarovits, C. Kurucz, M. Al-Sheikhly, and W. L. McLaughlin, "Large-Scale Dosimetry Using Dilute Methylene Blue Dye in Aqueous Solution", Radiation Physics and Chemistry, 52, 539-542 (1998).

25. W.L. McLaughlin, J. Silverman, M. Al-Sheikhly, W.J. Chappas, L. Zhan-Jun, A. Miller, and W. Batsberg-Pedersen, "High-Density Polyethylene Dosimetry By Transvinylene FTIR Analysis", Radiation Physics and Chemistry, 56, 503-508 (1999).

26. M. Chaychian**, J. Silverman, M. Al-Sheikhly*, D. Poster, and P. Neta, "Ionizing Radiation Induced Degradation of Tetrachlorobiphenyls in Transformer Oils", Environmental Science and Technology, 33, 2461-2464 (1999).

27. T. Feng**, M. Al-Sheikhly, A. Christou, "Defect Formation in SiGe/Si Structures Grown on GaAs by CVDS Techniques Utilizing Si:H Template Layer " , Materials Science and Engineering- B "on Critical Issue of Epitaxial Growth", B67, 70-75 (1999).

***Al-Sheikhly's Post-Doc

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28. S. Pierpoint**, J. Silverman, and M. Al-Sheikhly*, "Effects of Ionizing Radiation on the Aging of Polyester Based Polyurethane Binder", Radiation Physics and Chemistry, 62, 163-169 (2001).

29. A. Sadeghi**, M. Chaychian**, M. Al-Sheikhly*, and W.L. McLaughlin, "Radiation-Induced Reduction of Ditetrazolium Salt in Aqueous Solutions", Radiation Physics and Chemistry, 64, 13-18 (2002).

30. M. Chaychian**, C. Jones**, D. Poster, J. Silverman, P. Neta, R. Huie, and M. Al-Sheikhly*, "Radiolytic Dechlorination of PCBs in Transformer Oil and Marine Sediment, Radiation Physics and Chemistry, 65, 473-478 (2002).

31. C. Jones**, J. Silverman, M. Al-Sheikhly*, D. Poster, and P. Neta, "Dechlorination of Polychlorinated Biphenyls in Industrial Transformer Oil by Radiolytic and Photolytic Methods", Environmental Science and Technology, 37, 5773-5777 (2003).

32. H. Feng**, M. Al-Sheikhly*, J. Silverman, D. E. Weiss, and P. Netta, "Polymerization of Neat 2-Ethylhexyl Acrylate Induced by a Pulse Electron Beam", Journal of Polymer Science: Polymer Chemistry (Part A), 41,196-203 (2003).

33. L. Mohaddes Ardabili**, L. J. Martinez-Miranda, J. Silverman, A. Christou, L. G. Salamanca-Riba, W. E. Bentley, F. Ohuchi, and M. Al-Sheikhly*, "Attachment of DNA probes on GaAs surface", Applied Physics Letters, 83, 192-194, (2003).

34. H. Feng**, M. Al-Sheikhly*, D.E. Weiss, and J. Silverman, "The Role of Pulse Frequency and Acrylic Acid in the Radiation-Induced Bulk Polymerization of 2-Ethylhexyl Acrylate", Radiation Physics and Chemistry, 67, 347-352 (2003).

35. H. Harayama, M. Al-Sheikhly*, and J. Silverman, "Oligomer Formation in the Radiation-Induced Polymerization of Styrene", Radiation Physics and Chemistry, 68, 6 1023-1029 (2003).

36. D. Poster, M. Chaychian**, P.Neta, R.Huie, J. Silverman, and M. Al-Sheikhly*, "Degradation of PCBs in a Marine Sediment Treated with

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ionizing and UV Radiation", Environmental Science and Technology, 37, 3808-3815, (2003)

37. L. M. Ardabili**, M. Al-Sheikhly*, L. Martinaz-Miranda, A.Christou, J. Silverman, and, W. E. Bentley, "DNA self-assembly on GaAs", Journal of Applied Physics, 95, 6021-6024, (2004).

38. M. Al-Sheikhly*, D. Sweet**, L. Salamanca-Riba, B. Varughese, J. Silverman, A. Christou, and W. Bentley," Radiation-induced failure mechanisms of GaAs-based biochips, IEEE, Device and Materials Reliability, 4, No. 2, 192-197, (2004).

39. M. Al-Sheikhly*, J. Silverman, M. Simic, and B. Michael,"The Formation and Reactions of Alkyl, Allyl, Biallylic, and Peroxyl Radicals from Unsaturated Fatty Acids in Micellar and Monomeric Aqueous Solutions, Journal of Physical Chemistry-B, 108, 17618-17627 (2004).

40. C. Zhyang, P. Yalamanchili, M. Al-Sheikhly, and A. Christou," Metal Migration in Epoxy Encapsulated ECL Devices", Microelectronic Reliability, 44, 1324-1330, (2004).,

41. A. B. Mohamed**, J. Silverman, and M. Al-Sheikhly * "Monte Carlo simulations of complex geometries and an optimal 60Cobalt source design using the Integrated TIGER Series (ITS 3.0)" Journal of Nuclear Instruments and Methods in Physics Research B, 243, 359-370 (2006).

42. M. Al-Sheikhly*, D. Poster, Jung-Chul An, Pedi Neta, J. Silveman, and R. Huie "Ionizing Radiation-Induced Destruction of Benzene and Dienes in Aqueous Media", Environmental Science and Technology, 40 (9): 3082-3088 (2006)

43. Y. Zaikin, D. Aimuratov, M. Al-Sheikhly, "Dose rate effect on internal friction and structural transformations in electron-irradiated carbon-armored composites", Radiation Physics and Chemistry, Radiation Physics and Chemistry, 76, 8-9, 1399-1403 (2007)

44. Y. Zaikin, G. A. Ismailova, and M. Al-Sheikhly, Effects of Pulse Electron Beam Characterization on Internal Friction and Structural Alternations in Epoxy, 76, 8-9, 1404- 408 (2007)

45. C-K Chris Wang, Xin Zhang, Ian Gifford**, Eric Burgett, Vincent Adams, and Mohamod Al-Sheikhly, "Experimental Validation of the *New Nanodosimetry-Based Cell Survival Model for Mixed Neutron and

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Gamma-Ray Irradiations" Physics in Medicine and Biology, 52, N367-N374, (2007)

46. A. B. Mohamed, M. Al-Sheikhly*, and Richard Livingston " Monte Carlo Simulations of a Portable Prompt Gamma system for Nondestructive Determination of chloride in Reinforced Concrete Nuclear Inst. and Methods in Physics Research, B, 266, 3397-3405 (2008)

47. N Richard A. Livingston, Mohamad Al-Sheikhly, Ali B. Mohamed "Numerical simulation of the PGNA signal from chlorine diffusion gradients in concrete", Applied Radiation and Isotopes 68 (2010) 679–682

48. Jo-Chun Kim, Youn-SukSon a, Ki-JoonKim , Yong-JaeLim, Sang-GwiChung, Young Sunwoo, MohamadAl-Sheikhly*," Combined radiolytic and catalytic oxidizing method to remove toluene in gas phase", Radiation Physics and Chemistry, Volume 79, Issue 7, 797-802, **(**2010)

49. Jo-Chun Kim, Ki-Hyun Kim, Al Armendariz, Mohamad Al- Sheikhly," Electron Beam Irradiation for Mercury Oxidation and Mercury Emissions Control", Journal of Environmental Engineering, **In Press**, (2010).

50. Marina K. Chumakov, Layla Shahamat, Alia Weaver, Jill LeBlanc, Mahnaz Chaychian[a], Joseph Silverman[a], K. Benjamin Richter, Douglas Weiss, Mohamad Al-Sheikhly," Electron-Beam Induced Grafting of N-isopropylacrylamide to a Poly(Ethylene-Terephthalate) Membrane for Rapid Cell Sheet Detachment", Radiation Physics and Chemistry, **In Press**, (2010).

c. Refereed Proceedings and Transactions:

1. M. Al-Sheikhly* and W.J. Chappas, "Recent Advance in Processing of Materials", **Invited paper**, American Nuclear Society, Winter Meeting, November 26-30, 1989, San Francisco, Transactions of the American Nuclear Society (ANS), 60, 204 (1989).

2. M. Al-Sheikhly*, W. J. Chappas, W. L. McLaughlin and J. C. Humphreys, "The Effects of the Absorbed Dose Rate, Irradiation Temperature, and Post-Irradiation Temperature on the Gamma-Ray

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Response of the Red Perspex Dosimeter", proceedings of an International Symposium on High Dosimetry for Radiation Processing, organized by the Int'l Atomic Energy Agency, Vienna (5-9, November 1990), IAEA-SM-314/37, 419-434 (1991).

3. W. L. McLaughlin, J. C. Humphreys, W. Z. Ba M. Al-Sheikhly, W. J. Chappas, "Temperature Dependence of Radiochromic Films Dosimeters", Proceedings of an Int'l Symp. "On High Dosimetry for Radiation Processing", Organized by the Int'l Atomic Energy Agency, Vienna, 5-9, November 1990, IAEA-SM-314/37, 305-316 (1991).

4. E. C. Canfield** N. J. Grossman**, M. Al-Sheikhly*, W. J. Chappas, "Electron Beam Curing of Bismaleimide Carbon-Fiber Composites", **Invited Paper**, Amer. Nuc. Soc., Annual Mtg., June 7-12, 1992, Boston, Transaction of the American Nuclear Society, 65, 123 (1992).

5. M. Chaychian**, M. Al-Sheikhly* and W. McLaughlin, "Radiation Initiation Removal of Heavy Metals From Water", **Invited Paper,** Amer. Nuc. Soc., Annual Mtg., June 25-29, 1995, Philadelphia, Pennsylvania, Transactions of the America Nuclear Society, 72, 128-128 (1995).

6. M. Al-Sheikhly*, J. Silverman, P. Neta, and L. Karam, "Ionizing Radiation-Induced Destruction of 2,6-Dichlorobiphenyl in Aqueous Solutions", Proceedings of the EPRI-Second Int'l Symposium on Environmental Applications of Advanced Oxidation Technology, 1996. Published in the Proceedings of the Second International Symposium, 17-22 (1997).

7. M. Simic, M. Al-Sheikhly*, S. Jovanivic, "Inhibition of Free Radical Processes by Antioxidants-Tryptophan and 5-hydroxytryptophan", Nutritional Impact of Food Processing, 25th Symposium of the Group of European Nutritionists on Nutritional Impact of Food Processing, Editors: J.C. Somogyi and H.R. Muller, Reykjavik, September 2-4, 1986, Bibl. Nutr. Dieta. Karger. 43, 288-296 (1989).

8. M. Al-Sheikhly* and B. Coursey, "Possible Formation of Interpenetrating Polymer Networks (IPN) by Electron Beam Irradiation of Acrylated Epoxy Resin Blends", Polymer Preprints, 35, 880-881 (1994).

9. W. L. McLaughlin, D. F. Lewis, A. Kovacs, M. Al-Sheikhly*, and L. Wojnarovits, "A Radiochromic Solid-State Polymerization Reactions", Polymer Preprints, 35, 920-921 (1994).

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10. M. Al-Sheikhly* and A. Christou, "Ionizing-Radiation and High-Temperature-Induced Oxidation of the Electronic Packaging Materials of GE-HDI Electronic Board", "On Reliability of Electronic Devices", Proceedings of European Symposium on Reliability of Electron Devices, Failure Physics and Analysis (5^{TH}) Held in Glasgow, Scotland, 435-439, (4-7 October, 1994).

11. M. Al-Sheikhly*, A. Christou, and W.L. McLaughlin, "Radiation Gel-Core Fluorinated-Ethylene-Polyethylene Fiber Optics for Distributed Sensing of X and Gamma Rays", EUV, X-Rays, and Gamma-Ray Instrumentation for Astronomy VII Proceedings, Denver, SPIE Symposium, Colorado, 2808, 292-301, (1996).

12. P. Yalmanchili, M. Al-Sheikhly, and A. Christou, "Failure Analysis Cathode Filament Formation in Multilayer PWBs Using Combined Electron Spin Resonance and Micro- FTIR Technologies", Proceedings of Int'l Reliability Physics Symposium, Dallas, 258-266 (1996).

13. A. Christou, M. Al-Sheikhly*, and W.L. McLaughlin, "UV, Soft X-Ray and Gamma-Ray High-Resolution Imaging and Discrimination by Novel Photo-Polymer Film System," EUV, X-Rays, and Gamma-Ray Instrumentation for Astronomy VII Proceedings, Denver, SPIE Symposium, Colorado, 2808, 284-291 (1996).

14. M. Al-Sheikhly*, W.L. McLaughlin, A. Kovacs, L. Wojnarovits, C. Christou**, A. Christou, and D. Lewis, "Solid State Polymerization Reactions for Passive and Active Guided-Wave Components", "Optoelectronic Interconnects and Packaging IV)" SPIE Symposium, Optoelectronics Integrated Devices and Applications, 3005, 184-192 (1997).

15. C-K Hsu**, M. Al-Sheikhly*, W.L. McLaughlin, and A. Christou, "Radiochromic Smart Thin-Film Sensor", Materials Research Society Symposium Proceedings, 441, 743-748 (1997).

16. R-H Chang**, M. Al-Sheikhly*, and A. Christou, "Surface Oxidation Study of Silicon-Doped GaAs Wafers by FTIR Spectroscopy", Materials Research Society Symposium. 448, 75-80 (1997).

17. M. Al-Sheikhly*, W.L. McLaughlin, A. Christou, and A. Kovacs, "Radiochromic Blue Tetrazolium Film Dosimeter", "Proceeding of the International Symposium on Techniques for High-Dose Dosimetry in Industry, Agriculture and Medicine", Vienna, 59-63 (1999).

18. Burgett, E., Wang, C.K., Zhang, X., Al-Sheikhly, M., Gifford, I., Adams, V. A high LET neutron irradiation facility for biological samples at the MUTR. Transactions of the American Nuclear Society Vol. 94/. Reno, NV; June 4-8, 2006.

19. M. Al-Sheikhly, A. Christou, "The limitations of GaAs/DNA Based bio-Memory and Sensing Device," WOCSDICE, pp.143-148, Cardiff, (2006)

20. Burgett, E., Blaylock, D., Hertel, N, Gifford, I., Mohamed, A., Adams, V., Al-Sheikhly, M. "MUTR Fuel Bundle Reactivity Worth" ANS Transactions 2007, 96, 407-410.

d. Education-Related Publications

21. eaching Undergraduates and Graduate Students Results From Recent Research As Part of a Class", L. J. Martinez-Miranda, R. J. Briber, I. K. Lloyd, O. Wilson, M. Al-Sheikhly and L. G. Salamanca-Riba, **Invited,** 2001 Spring Meeting Proceedings, GG1.5, MRS Proceedings Volume 684E (2001).

e. Un-refereed Proceedings

22. M. Al-Sheikhly* and J. Silverman, "On the Mechanisms of E-beam Treatment of Toxic Wastes in Aqueous Solutions", Proceedings of the National Science Foundation Workshop, Miami, Editor: C. N. Kurucz, 119-123, Florida (1995).

23. M. Chaychian**, M. Al-Sheikhly*, J. Silverman, and W. L. McLaughlin, "Radiation Induced Removal of Heavy Metals from Aqueous Solutions", Proceedings of Workshop on the Potential for Engineering-Scale Processing of Waste Treatment Streams by Electron-Beam Irradiation, University of Miami, Sponsored by the National Science Foundation, 153-160 (1997).

24. D. Schmelling*, M. Chaychian**, M. Al-Sheikhly*, J. Silverman, P. Neta, D. Poster, and L. Karam, "Destruction of Polychlorinated Biphenyls (PCBs) in Aqueous Systems by Ionizing Radiation", Proceedings of Workshop on the Potential for Engineering-Scale Processing of Waste Treatment Streams by Electron-Beam Irradiation, University of Miami, Sponsored by the National Science Foundation, 161-172 (1997).

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**Al-Sheikhly's Student\

*** Al-Sheikhly's Research Associate

f. Monographs, Reports, and Extension Publications

- Chair of the Subcommittee for that published this report, Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing", Published in ASTM- "Nuclear, Solar, and Geothermal Energy, ASTM, 12.02, 685-696, 1998.

- Co-Editor of the Proceedings "- National Science Foundation (NSF)-sponsored workshop on "Determination of optimum radiolytic treatment methodologies for remediation of PCBs contaminated sites". University of Maryland, College Park, November 15-17 (1999).

- Author: "Applications of Radiation in Nanotechnology; X-ray Electron Beam Lithography" International Atomic Energy Agency (IAEA) 2005

- Author: "Electron Beam Treatment of Organic Pollutants Contained in Gaseous Streams" International Atomic Energy Agency (IAEA) 2005.

g. Invited and Plenary Talks and Presentations

1. "Radiation Dosimetry and Calibration", The Second International Workshop on Dosimetry for Radiation Processing, University of Maryland, College Park, MD, October 6-11 (1991).

2. "Electron Beam Curing of Carbon-Fiber Epoxy Composite Materials", General Dynamics, Fort Worth, Dallas, December 16 (1991).

3. "Radiation Chemistry of the E-Beam Treatment of Toxic Materials in Aqueous Media", Department of Chemistry, University of Maryland, College Park, MD, April (1994).

4. "Radiation-Initiated Removal of Heavy Metals from Water", American Nuclear Society, Annual Meeting, Philadelphia, Pennsylvania, June 25-29 (1995).

5. "Calibration of the Dosimetry systems", Third International Workshop on Dosimetry for Radiation Processing, Ste.-Adele, Quebec, Canada, October 1-6 (1995).

6. "The Removal of Heavy Metals by E-Beam Radiation", International Chemical Congress of Pacific Societies", Honolulu, USA December (1995).

"On the Mechanisms of the Polymerization Initiation of N-P-Tolylglycine", International Chemical Congress of Pacific Societies, Honolulu, USA, December (1995).

7. "Application of E-Beams in the Environmental Remediation", Department of Chemical Engineering, University of Maryland, College Park, MD, October 30 (1995).

8. "Electron-Beam Treatment of Heavy Metal in Aqueous Solutions and Electron-Beam Treatment of PCBs in Aqueous Solutions ", A workshop on the Potential for Engineering Scale Processing of Waste Treatment Systems by Electron-Beam Irradiation "Sponsored by the National Science Foundation, Key West, Florida, January 13-15 (1997)

9. "Application of Radiation Engineering in Environmental Remediation", National Institute of Standards and Technology, Gaithersburg, MD, May 12 (1997).

10. "High Energy Electron Beam Processing in the Remediation of Polychlorinated Biphenyls", International Atomic Energy Agency (IAEA)-Consultant Meeting, Miami-Florida, December 8-11 (1997).

11. "Radiation sterilization of Pharmaceutical Compounds" IAEA-First Research Co-ordination Meeting on "The Use of Radiation Processing for Sterilization or Decontamination of Pharmaceuticals and Pharmaceutical Raw Materials", Vienna, Austria, 30 November-3 December (1998).

12. "DNA Integrated with Semiconductor for High Density Memory", Fall Distinguished Speaker Colloquium Series, Department of Materials and nuclear Engineering, University of Maryland, College Park, MD, December 11 (1998).

13. "Applications of radiation engineering in environmental remediation", International Conference on Future Nuclear Systems, Snowking Resort, Jackson Hole, Wyoming, August 29-September 3 (1999).

14. "Electron beam curing of epoxid-fiber composites", Council on Ionizing Radiation Measurements and Standards (CIRMS), National Institute of Standards and Technology, Gaithersburg, MD, October 13-15 (1999).

15. "Electron beam-induced conductivity in PVC/PANI, VCI/Vac/PANI and PPCI Blends", Council on Ionizing Radiation Measurements and Standards (CIRMS), National Institute of Standards and Technology, Gaithersburg, MD, October 13-15 (1999).

16. "Application of electron beam technology in the remediation of PCBs contaminated sites", Beijing Radiation Application Research Center. Beijing, China, May (1999).

17. “On the radiation chemistry mechanisms of the electron beam curing of epoxy-carbon-fiber composite", Beijing Radiation Application Research Center. Beijing, China, May (1999).

18. “Application of radiation engineering in advanced manufacturing", Peking University, Beijing, China, May (1999).

19. "Application s of epoxy-carbon fiber composite in cryo-technology", Lockheed Martin Michoud Space Systems, New Orleans, LA, January (2000).

20. “Application of radiation engineering in the advanced manufacturing of epoxide-carbon –fiber composites”, Workshop on E-Beam Curing Kinetics, University of Delaware Center for Composite Materials, April 13 (2000).

21. “On the radiolysis of fatty acids micellar systems and the role of the antioxidants”, Sponsored by International Atomic Energy Agency (IAEA), Second Research Co-ordination Meeting on “The use of radiation processing for sterilization or decontamination of pharmaceutical raw materials”, Cairo, Egypt 06-10 May (2000).

22. “On the mechanisms of the radiation chemistry of ultra –high molecular weight polyethylene and its application in the medical implant”, Sponsored by International Atomic Energy Agency (IAEA)- Consultant Meeting on Post-irradiation stability of radiation sterilized medical implants, University of Maryland at College Park, August 29- September 1 (2000).

23. “Radiation-induced copper migration in the printed circuit boards”, Ninth annual meeting of the Council on Ionizing Radiation Measurements and Standards (CIRMS), sponsored by NIST, October 30-September 1 (2000).

24. “The selection criteria for dosimetry systems”, Fourth International Workshop on Dosimetry for Radiation Processing”, San Diego, CA, October 22-27 (2000).

25. “Fundamental aspects of the radiation resistance of polymers”, Johnson and Johnson Company-Ethicon, March 14 (2001).

26. "Near infrared photo-induced hybridization of DNA in aqueous solutions and techniques to attach DNA probes to GaAs and GaN surfaces", Symposium B, Molecular and Biomolecular Electronics, Materials Research Society (MRS)-Spring-Meeting, San Francisco, CA, April 16-19 (2001).

27. "The role of antioxidants in the radiolysis of fatty acids micellar systems and liposome", Sponsored by International Atomic Energy Agency (IAEA), Third Research Co-ordination Meeting on "The use of radiation processing for sterilization or decontamination of pharmaceutical raw materials", Ankara, Turkey 10-14 May (2001).

28. "Optically addressed DNA on a ship", The Center for Optoelectronic Devices, Interconnects, and Packaging-Review, University of Maryland, November 30 (2001).

29. "Kinetics and mechanisms of the radiation-induced polymerization of acrylated systems", **Keynote Presentation,** Polymer Processing Society Meeting, PPS' 2001, Antalya, Turkey, October 22-24 (2001).

30. "On the mechanisms of the electron-beam induced polymerization of 2-ethyl acrylate", 10th "Tihany" Symposium on Radiation Chemistry, August 31-September 5 (2002).

31. "The radiation chemistry of polyethylene and terazolium dosimeters", Workshop on Advances in High-Dose Dosimetry, National Institute of Standards and Technology, Gaithersburg, MD, April 24-25 (2003).

32. "Radiation-induced grafting of butadiene to poly(vinylchloride)", American Chemical Society Meeting**,** New York**,** July (2003).

33. "Determination of optimum radiolytic treatment methodologies for remediation of PCB contamination sites", Department Seminar, Department of Chemical Engineering, University of Maryland, College Park, MD, April (2003).

34. "Radiation Chemistry and the Remediation of PCB-Contaminated Sites", Department of Chemistry and Biochemistry, University of Maryland, College Park, MD, April, 2004.

35. "Electron Beam Remediation of PCB Contamination Sites", First Research Coordination Meeting on Electron Beam Treatment of Organic Pollutants Contained in Gaseous Streams, International Atomic Energy Agency, Headquarter, Vienna, Austria, 23-27 May, 2005.

36. “Pulsed Beam Polymerization”, Faculty of Physics, Al Farabi Kazakh National University, Almaty, Kazakhstan, June 3, 2005.

37. “Destruction of Hazardous Organic Compounds in Aqueous Industrial Waste Streams” Consultants Meeting on Nuclear analytical techniques for determination of halogenated organic pollutants in the environment”, International Atomic Energy Agency, Headquarter, Vienna, Austria, September 20-23, 2005.

38. “Radiation chemistry and processing of polymers”, Radiation Processing of Polymers Conference” Society of Plastics Engineers” Philadelphia, Pennsylvania, November 10, 2005

39. “Uncertainty Considerations for PGNA Measurement of Chlorides in Concrete” Richard A. Livingston, Ali Mohamad and Mohamad Al-Sheikhly, 15TH Annual Meeting of the Council on Ionizing Radiation Measurements and Standards, Implications of Uncertainty in Radiation Measurements and Applications, NIST, Gaithersburg, MD, USA, October, 23-25, 2006

40. “Effects of Ionizing Radiation on Volatile Organic Contaminants”, Mahnaz Chaychian and Mohamad Al-Sheikhly, 2nd RCM (Research Co-ordination Meeting) of the International Atomic Energy Agency's Coordinated Research Project on " Electron Beam Treatment of Organic Pollutants Contained in Gaseous Streams" at Beijing, China from 16 to 20 October 2006.

41. “Kinetics of Remediation of Polychlorinated Biphenyls (PCBs) Induced by Electron Beam Irradiation in Aqueous and Aqueous Micellar Solutions, and Transformer Oil), 25th Miller Conference on Radiation Chemistry, Buxton, United Kingdom, April 14-18, 2007

42. “Radiation-Induced Destruction of Volatile Organic Compounds in Aqueous Solutions by Dual Oxidation/Reduction Mechanisms” Prospects and Challenges in Application of radiation for Treating Exhaust Gases”, International Atomic Energy Agency (IAEA), Warsaw, Poland, 14-18 May, 2007

43. “Kinetics of reductive remediation of polychlorinated biphenyls (PCBs) induced by electron beam irradiation” Department of Civil Engineering University of Maryland Baltimore County, May 24, 2007

44. “Future Trends on Nuclear Applications in Nanotechnology” 2007 International Nuclear Atlantic Conference (INAC 2007), Santos, Brazil, September 30-October 5, 2007

45. “Synthesis and Modification of Functional Polymer Nano-hydrogels Using Pulse Electron Beams” ASR 2007, International Symposium on "Charged Particle and Photon Interactions with Matter", Advanced Science Research Center, Japan Atomic Energy Agency (JAEA) in Tokai, JAPAN, 6th - 9th November, 2007

46. “Advances in Electron Beam Grafting of Isopropylacrylamide (IPAA) to a Poly(ethylene terephthalate) (PET) Membrane for Cell Sheet Detachment”, 1st RCM (Research Coordination meeting)) of the International Atomic Energy Agency on” Development of Novel Adsorbents and Membranes by Radiation-Induced Grafting for Environmental and Industrial Applications”, Vienna, Austria 19-23 November (2007)

47. “Radiation Chemistry of Radiochromic and Alanine Dosimetry”, ASTM-Committee E10 on Nuclear Technology and Applications E10-01 committee meeting, American Society for Testing and Materials (ASTM), Tampa -Florida, January 27-30, 2008

48. “ The New Trends in Radiation Engineering” Yeungnam University, Daegu, Korea, March 10, 2008

49. “The following four lectures at Korea Atomic Energy Institute (KAERI):

    a. Synthesis and characterization of nano gel using electron irradiation

    b. Electron beam remediation of toxic materials

    c. Ionizing radiation-induced formation of ethylhexyl acrylate-acrylic acid copolymer

    d. Electron beam processing of heavy oil

50. “The fundamental and future trends in the applications of electron beam technology in nano manufacturing and environmental remediation, School of Environment & Chemical Engineering, Chonbuk National University, Korea, March 13, 2008

51. “Recent and Future Trends in Electron Beam Applications for Nano and Advanced Technologies”, The Third Electron Beam Workshop, Taejon, Korea, March 14, 2008

52. “Kinetics of reductive remediation of polychlorinated biphenyls (PCBs) induced by electron beam irradiation”, Department of Advanced

Technology Fusion and Dept. of Environmental Engineering, Konkuk University Soul, Korea, March 14, 2008

53. "Challenges in the Synthesis of Nano-materials for a Wide Variety of Applications", Cross Industry Issues in Nano-manufacturing Workshop. National Institute of Standards and Technology, NIST, Gaithersburg, Maryland, USA, May 20-22, 2008

54. "Synthesis and Modification of Functional Polymer Nano-hydrogels Using Pulsed Electron Beams", Gordon Research Conferences-Radiation Chemistry, July 6-11, 2008

55. "Synthesis and Modification of Functional Polymer Nano-hydrogels Using Pulsed Electron Beam", University of Kanazawa, Japan, August 28, 2008

56. "Radiation-Synthesized Iron Ionomers based on Copolymers of 2-Ethylhexyl Acrylate and Acrylic Acid", The 2nd Asia-Pacific Symposium on Radiation Chemistry, Tokyo, Japan, August 29 – September 1, 2008

56. "Kinetics of reductive remediation of polychlorinated biphenyls (PCBs) induced by electron beam irradiation", The International Meeting on Radiation Processing, IMRP-London, September 21-25, 2008

57. Synthesis and Modification of Functional Polymer Nano-hydrogels Using Pulsed Electron Beams, Council of ionizing Radiation and Measurements, CIRMS 17th Meeting, Gaithersburg, Maryland, USA, October 6-8, 2008

58. Synthesis and Modification of Functional Polymer Nano-hydrogels Using Pulsed Electron Beams, IRaP2008, 8th International Symposium on Ionizing Radiation and Polymers, Rio de Janeiro, Angra, Brazil, October 12-17, 2008

59. Electron Beam Processing of Heavy Oils and Bio-fuel Production, The 4th Workshop on Electron Beam Applications, March 13, 2009, Korea Atomic Energy Research Institute, Yusong Taejon, Korea

60. Introduction to Radiation Chemistry, Invited lectures, March 14-15, 2009, Korea Atomic Energy Research Institute, Yusong Taejon, Korea

61. International Atomic Energy Agency (IAEA)- 2nd Research Coordination Meeting on " Development of novel absorbents and membranes by radiation-induced grafting for selective purposes: Electron Beam Grafting of Isopropylacrylamide (IPAA) grafted on

Poly(ethylene terephthalate) (PET) for cell sheets, 14-19 August, 2009, Paul Scherrer Institut (PSI), Aargau, Switzerland

62. The Fundamental Radiation Chemistry Mechanisms and Kinetics of Electron Beam Irradiation Polymerization, and Grafting, Paul Scherrer Institut (PSI), Aargau, Switzerland, August 15, 2009

63. High-Energy Radiation Processing Symposium**,** the 3M Company, 3M Center, St. Paul, MN, August 11-13, 2009:

    - Radiation Grafting of Membranes for Biological Applications and Fuel Cells
    - Role of Acrylic Acid in the E-Beam Polymerization of 2-EHA-based Adhesives
    - Nano-Hydrogels for Advanced Drug Delivery

64. The Synthesis of Polymer Nano-Hydrogels Using Pulsed Electron Beams, 26th Miller Conference on Radiation Chemistry, Hungary, Keszthley, August 28-September 2, 2009

65. **Keynote lecture**: The 11th Pacific Polymer Conference and Symposium on the Radiation Modification of Polymers,"On the Mechanisms of Synthesis of POLYMER NANO-HYDROGELS USING PULSED ELECTRON
BEAMS, Cairns, Australia, December 6-10, 2009

h. Contributed Presentations

1. "Rod-Shaped Micelles as a Model of Membranes in Autoxidation and Antioxidation Processes", Fourth International Congress on Oxygen Radicals, La Jolla, CA, June (1987).

2. "Chain Autoxidation of Linoleic Acid in Aqueous Media", Eighth International Congress of Radiation Research, Edinburgh, Scotland, July (1987).

3. "The Effects of the Absorbed Dose Rate, Irradiation Temperature, and Post-Irradiation Temperature on the Gamma-Ray Response of the Red Perspex Dosimeter", IAEA Meeting on Industrial Radiation DosimetryVienna, November (1990).

4. "On the Mechanisms of E-beam Treatment of Toxic Wastes in Aqueous Solutions", National Science Foundation (NSF) Workshop, Applications of Ionizing Radiation for Decontamination of Environmental Resources, Miami, Florida, June 1-3 (1994).

5. “A Novel Radiation Engineering Approach for Enhancement of the Efficiency of the E-beam Treatment of Industrial Wastewater”, The First International Conference on Advanced Oxidation Technologies for Water and Air Remediation, London Ontario, Canada, June 25-30 (1994).

6. “Possible Formation of Interpenetrating Polymer Networks (IPN) By Electron-Irradiation of Acrylated Epoxy Resin Blends”,American Chemical Society Meeting, Washington, DC, August (1994).

7. “On the Mechanisms of E-Beam Destruction of PCBs”, AlChE Spring National Meeting, New Orleans, February (1996).

8. “Ionizing Radiation-Induced Destruction of 2,6-Dichlorobiphenyl in Aqueous Solutions Destruction Using High-Powered Industrial Radiation Processing”, Electric Power Research Institute-Second International Symposium on Environmental Applications of Advanced Oxidation Technologies, San Francisco, CA, March (1996).

9. “Failure Analysis of Cathode Analysis of Cathode Filament Formation in Multilayer PWBs Using Combined Electron Resonance and Micro-FTIR Techniques”, IEEE, International Reliability Physics Symposium, Dallas, Texas, April, (1996).

10. “Radiation Gel-Core Fluorinated -Ethylene-Polyethylene Fiber Optics for Distributed Sensing of X and Gamma Rays”, SPIE, Symposium, Denver, Colorado, August (1996).

11. “UV, Soft X-Ray and Gamma-Ray-High-Resolution Imaging and Discrimination by Novel Photo-Polymer Film System”, SPIE Symposium, Denver, Colorado, August (1996).

12. “Radiation-Induced Removal of Heavy Metals From Aqueous Solutions”, The Third International Conference on Advanced Oxidation Technologies For Water and Air Remediation, Cincinnati, Ohio, October 26-29 (1996).

13. “Integration of new research results and technologies to the teaching of undergraduate materials laboratory”, L. J. Martinez-Miranda, J. Kidder, M. Al-Sheikhly and L. G. Salamanca-Riba, Presented at the Spring MRS Session on Education on Materials, April 25 (2000).

14. “Reductive Degradation Kinetics of Polychlorinated Biphenyls Induced by Ionizing of Radiation in Aqueous and Aqueous Micellar Solutions, and Transformer Oiling ” American Chemical Society Meeting” San Diego, California, March 13, 2005.

15. " Potentialities of hydrocarbon radiation processing for reduction of environmental pollution by petroleum products ",R. Zaikina, Yu. Zaikin, J. Silverman, and M. Al-Sheikhly. 4th International Conference "Oils and Environment". Page: 296-303, Gdansk University of Technology, Gdansk, Poland, June 20-23, 2005.

16. "Radiation Chemistry and the Remediation of PCB Contamination Sites" American Chemical Society Meeting, Washington, DC, June 1, 2005

17. "Nano-confined polymer hydrogels for Drug Delivery System using radiation synthesis" Jung-Chul An**, Lourdes G. Salamanca-Riba, Joseph Silverman, Mohamad Al-Sheikhly* MRS-Meeting Boston, December 2005.

18. "Radiation-Induced Reductive Dechlorination of PCB-Contaminated Sites "11th "Tihany" Symposium on Radiation Chemistry, Eger, Hungary 26-31 August, 2006

19. "Kinetic Study of the Radiation-Induced Copolymerization of 2-Ethylhexyl Acrylate and Acrylic Acid", Alia Weaver Joseph Silverman, Lourdes Salamanca-Riba, and Mohamad Al-Sheikhly, AIchE Fall meeting (2007), Salt Lake City, USA

20. "Characterization of DNA Oligonucleotides Immobilized on Arsenic Terminated GaAs Surfaces (001)", Joon Hyuk Yang**; L. Salmanca-Riba; M. Al-Sheikhly, MRS Fall meeting (2007), Boston, USA,

21. "Brush Like Structure Array of Thiolated DNA Oligonucleotides Attached to As-Terminated Gallium Arsenide (001)", Joon Hyuk Yang**; J.C. An; L. Martinez-Miranda; L. Salmanca-Riba; M. Al-Sheikhly, AIchE Fall meeting (2007), Salt Lake City, USA

22. ""Radiation induced intra- and inter-crosslinked poly(vinyl pyrrolidone) nanohydrogels for drug delivery", Jung-Chul An**, Poster D., Vreeland W.N., Silverman J., Al-Sheikhly M., MRS Fall Meeting Symposium, Boston, MA, November 26 – 30, 2007.

23. "Nano-structured functional poly(vinly pyrrolidone) hydrogels synthesized by ionizing irradiation", Jung-Chul An**, Poster D., Vreeland W.N., Silverman J., Al-Sheikhly M., AIChE Annual Meeting, Salt Lake City, UT, November 4 – 9, 2007.

** Al-Sheikhly's student

24. "Nano-confined polymer hydrogels synthesized by ionizing irradiation", Jung-Chul An**, Poster D., Silverman J., Al-Sheikhly M., 23 rd Southern Biomedical Engineering Conference, Washington D.C., April 13 – 15, 2007.

25. "On the Novel Use of Nitroxides and □- Tocopherol as Radiolytically Produced Free Radicals Scavengers in UHMEP", Marina Chumakov**, Joseph Silverman, and Mohamad Al-Sheikhly, 3rd Ultra High Molecular Weight Polyethylene (UHMWPE) International Meeting in Madrid, Spain.

26. Burgett, E., Blaylock, D., Hertel, N, Gifford, I., Mohamed, A., Adams, V., Al-Sheikhly, M. "MUTR Fuel Bundle Reactivity Worth" ANS Transactions 2007, 96, 407-410.

i. PATENTS

1. "Color-Matched, Ambient-Light Visual Comparator Dosimeter", US-Patent No. 4,864,144. Originally was designed for Federal Emergency Management Agency(FEMA), M. Al-Sheikhly, M. Farahani, W. Chappas, and W.L. McLaughlin.

2. "Nitroxide Antioxidants for Polyethylene" Marina Chumakov**, Mohamad Al-Sheikhly, and Joseph Silverman, pending (2007)

3. "Radiation Processing of Heavy and Paraffinic Oils", Mohamad Al-Sheikhly and Joseph Silverman (2007)

AWARDS

- Best Paper Award, The International Conference of High Dose Dosimetry, (Paper title: "Novel Radiochromic Films Clinical Dosimetry" Budapest, Hungary, July 1995.

- Award of ASTM-Committee-E10-Nuclear Technology and Applications, "For Outstanding Leadership as the Symposium Co-chairman for the Second International Workshop on Dosimetry for Radiation Processing", October 1991.

- Award of ASTM-Committee-E10-Nuclear Technology and Applications, "For Outstanding Leadership and Service to ASTM Subcommittee E10.01" as Chairman of the task group that successfully developed the Standards "Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing", January 1995.

- In*vention of the Year Finalist "Process for Hydrogen Bonding Between Chain Molecules and Novel Applications to Information and Analytical Technology and Devices", Office of Technology Liaison-Research and Graduate Studies", 1999.

- The 3M Company faculty-Award, (The 3M Company gift), September, 2000

- ASTM-Committee E10 on Nuclear Technology and Applications, Award of Appreciation" For Outstanding Leadership and Services to ASTM Subcommittee E10-01 As the Chairman of the Task Group that Developed the Revised Standard Guide for Selection and Calibration of Dosimetry Systems For Radiation Processing", 2001.

- Philip Merrill Presidential Scholars Program in Recognition of Mohamad Al-Sheikhly Faculty Mentor, 2005-2006, November 4, 2005

Editorships, Editorial Boards, and Reviewing Activities

- Guest Editor, Journal of Radiation Physics and Chemistry, The journal for Radiation Physics, Radiation Chemistry and Radiation Processing, 56, Number 4, October 1999

- Reviewer of proposals for, NSF, DOE, and FDA.

- Reviewer of scientific papers for the following refereed journals:

    1. Radiation Physics and Chemistry
    2. Environmental Science and Technology
    3. Polymer Science

PROFESSIONAL AFFILIATIONS

- American Society for Testing and Materials (ASTM)

- Material Research Society

- American Nuclear Society

- Council on Ionizing Radiation Measurements and Standards (CIRMS)

** Al-Sheikhly's student

- American Chemical Society

- Oxygen Club (Washington, D. C.)

3. TEACHING and ADVISING

Courses Taught

- Polymer Physics –ENMA 620 (Spring 2005, 2006)

- "Radiation Engineering"- ENNU 655 (Spring of 1995, 1996, 1997, 1998, 1999, 2004, 2005, 2006, 2007)

- "Environmental Chemical Engineering"- ENCH 468J (Fall 1996)

- "Nuclear Technology Laboratory"- ENNU 440 (Spring 2004)

- "Introduction to Electronic Packaging Materials"- ENMA 489C (Spring of 1997, 1998, 1999, 2000, 2001, 2002)

- "Degradation of Materials"- ENNU 489A cross listed with Degradation of Materials" - ENMA 698D (Fall of 1996 and 1997)

- "Radiation Effects in Polymers"- ENMA 698R (Fall 1997)

- "Radiation Engineering"- ENMA 489E (Fall of 1999, 2000, 2001, 2004)

- "Introduction to Engineering Design"- ENES 100 (Fall 1998, Fall 2000, Fall 2003, Spring 2004)

- "Environmental Effects on Engineering Materials"- ENMA 489 (Fall 1996, Spring 2000,

New Courses Developed and Taught

- "Applied Radiation Physics" ENNU 631

- "Radiation Engineering" ENNU 655

- Special Problems in Materials Science and Engineering "Degradation of Materials" ENNU 489C & ENMA 698D

- Special Problems in Materials Science and Engineering "Radiation Effects in Polymers" ENMA 698R

- "Environmental Chemical Engineering" ENCH 468J (Taught at the Department of Chemical Engineering).

- "Radiation Engineering" ENMA 489E cross-listed with ENNU 468E

- "Environmental Effects on Engineering Materials" ENMA 489

Teaching contributions to the following classes:

- ENMA 310, Laboratory for Materials, (Coordinator: Prof. L. Martinez-Miranda and Prof. R. Briber)

- ENMA 311, Laboratory for Materials (Coordinator: Prof. L. Martinez-Miranda)

- ENMA 181 I, Introduction to Engineered Materials Seminar (Coordinator Prof. Otto Wilson)

- ENMA 489D (Cross-listed with ENRE 489D), Applied Reliability Engineering II (Coordinator Prof. M. Roush)

- ENRE 648, Reliability engineering (Coordinator Prof. J. Bernstien)

- ENNU 320, Reactor Operation. (Sharing responsibility with Prof. Gavrilas)

- ENES 101, Assisting Prof. Gary Pertmer (2007)

- Radiation Technology ENNU 440 (2008) (Assisting Prof. Gary Pertmer)

Short Intensive Courses:

- Organizing and developing the following short and intensive courses on "High dose Dosimetry for Radiation Processing":

    1. Basic Reactor Operations, for Defense Nuclear Facilities Safety Board, Department of Defense, August 5-9, 2002.

    2. Basic Reactor Operations, for Nuclear Regulatory Commission (NRC), August 14-19, 2002.

    3. "An Intensive High-Dose, Professional Radiation Development Dosimetry Course", October 13-15, 1993

4. "Intensive Course in High Dose Dosimetry", October 6-10, 1991

ADVISING

Undergraduate students

- Riza Modarres (Sterilization dose effects on the liposome) 1998-2000
- Tony Chies-Chemical Engineering (oxygen uptake in the radiolysis of PCBs in organic and aqueous solutions) 1998-2000
- Joshua Emmer (High–dose dosimetry of radiochromic films) 2000-Present
- Dori Votalato (Crosslinking of high molecular weigh polyethylene and its application in medical implants)1999-2002
- Christopher Cox (Electron beam dosimerty at the interfaces), 2000
- Deborah Sweet-Chemical Engineering (Attachment of DNA on semiconductors), 2003-Present, **Recipient of Goldwater Award**
- Jeff Seifried (Nuclear Reactor Operation), 2003-2005
- Brandon Hartle (Nuclear Reactor Operation) 2004-Present
- Jill LeBlanc (2007) REU program
- Michael Pertmer (Nuclear Reactor Program) (2007)
- Victoria Seng (2007) (Lipid peroxidation)

Masters Students (Completed)

- Sujita Pierpoint, (Radiation Engineering), 1992 (Thesis title: Dichromate dosimetry).

- E. C. Canfield (Thesis title: Radiation-aided manufacturing of Composite), 1992

- Nick Dusich, (Radiation Engineering), 1993 (Title of the Scholarly paper: Installation of 7-32 MeV electron accelerator for medical and radiation dosimetry).

- C-K Hsu, (Materials Engineering), June1997 (Scholarly paper title: Radiochromic thin-film sensor using blue tetrazolium in polyvinyl alcohol).

- R. H. Chang, (Materials Engineering), June, 1997 (Scholarly paper title: Surface oxidation study of silicon-doped GaAs wafers by FTIR spectroscopy).

- Michael Galler, (Materials Engineering), May, 2001(These title: Model for settling and packing of tri-axial ellipsoids).

- Ali Mohamed, (Radiation Engineering), December 2001 **(**Scholarly Paper title: Spatial dose distribution produced by electron-gamma sources for complex absorber).

- Mohamad Al-Hashish (Radiation Engineering), December 2001, (Thesis title: Oxidation of soluble hydrogen by dichromate and permanganate in aqueous solutions).

- Ladan Mohaddes Ardabili, (Materials Engineering), June 12, 2004 (Thesis title: DNA self-assembly on gallium arsenide).

- Honxia Feng (Materials Engineering), June 2002 (Thesis title: Radiation-induced bulk polymerization of 2-ethylhexyl acrylate).

- Hathaway, Todd, June 2009

- Anders Gilbertson, June 2009

Doctoral Students (completed)

- Cynthia Jones, "Nuclear Engineering", **August 2000,** (Dissertation's Title: Application of radiation engineering in the remediation of PCBs in the capacitors and transformers used in power utilities), currently employed at the Nuclear Regulatory Commission (NRC)

- Sujita Pierpoint, "Nuclear Engineering", **July 2002**, (Dissertation's Title: Radiation-induced aging on the nuclear weapons binders), currently employed at the US-DOE.

- Malek Shatila, Nuclear Engineering, **September 2003,** (Dissertation's Title: A comparative neutronic feasibility study for a hydrogen, deuterium and helium cold neutron sources saturated in the center of a nuclear reactor core), currently employed as a **lecturer** at the American University- Beirut

- Marc Garland, Nuclear Engineering, **July, 2004, "**Dissertation's Title: Neutronic effects on tungsten-186 double neutron capture". Currently, employed as tenure track assistant professor at the University of South Carolina-Department of Mechanical Engineering

- Mahnaz Chaychian, **May 2007**, "Dissertation's title: Radiation-induced dechlorination of PCBs and chlorinated pesticides and the destruction of hazardous organic solvents in waste water".

- Jung-Chul An, **December , 2007,** "Dissertation Title : SYNTHESIS, CHARACTERIZATION, AND KINETIC STUDIES OF IONIZING RADIATION-INDUCED INTRA- AND INTER-CROSSLINKED POLY(VINYL PYRROLIDONE) NANOHYDROGELS

- Alia Paige Weaver, **December , 2007, "**Dissertation Title : Ionizing Radiation-Induced Copolymerization of 2-Ethylhexyl Acrylate and Acrylic Acid and Ionomer Formation

- Joon-Hyuk Yang, **December , 2007**, **"**Dissertation Title : The ATTACHMENT AND CHARACTERIZATION OF DNA PROBES ON GAAS-BASED SEMICONDUCTOR SURFACES"

- Kasser, Michael Jacob, December 2009, **"**Dissertation Title: The Photochemistry of Polyenyl Radicals and Its Applications to UHMWPE for Use in Artificial Cartilage"

- Ali, Mohamed, December 2009, **"**Dissertation Title: Uncertainty in Flux Maps Obtained from Core Geometry Applications: Monte Carlo Simulations and Benchmark Measurements for a 250 kW TRIGA Reactor"

- Hall, Donald E. December 2009, "Dissertation Title: Modeling and Validation of Dosimetry Measurement Assumptions Within the Armed Forces Radiobiology Research Institute TRIGA Mark F Reactor and Associated Exposure Facilities Using Monte Carlo Techniques"

Doctoral Students (In progress): Total : 13 current PhD students

- Andrea Twarowski, (Materials Engineering - The radiation chemistry of polymer-based binders for nuclear wastes) Expected defense date: January December 2011

- Wendy Wong, (Nuclear Engineering - Reactor core dosimetry by photoluminescence and spectrophotometry of encapsulated pure ^{6}LiF and ^{7}LiF chip) Expected defense date: January December 2008, Funded by DOE.

- Ian Gifford (Bioengineering)- Boron Capture Therapy. Expected defense date: December 2010 Funded by AFRI

- Paulette Torrs (Nuclear Engineering), Expected defense date: June 2011, Funded by Nuclear Regulatory Commission (NRC).

- Marina Chumakov, (Bioengineering, Supported by DOE, Expected defense date: December 2010

- Layla Shahamat, Nuclear Engineering, Expected defense date: June 2012

- Amanda Forster, Materials Science and Engineering, Expected defense date: June 2011

- Jake McComb, Nuclear Engineering, Expected defense date: June 2012

- Amy Beasten, Nuclear Engineering, Expected defense date: December 2012

- Goodwin, Cameron, Nuclear Engineering, Expected defense date: December 2012

- Vega, Daniel , Nuclear Engineering, Expected defense date: December 2012

- Okuyinu, Ore, Nuclear Engineering, Expected defense date: December 2012

- Grdanovska, Slavica, Nuclear Engineering, Expected defense date: December 2012

Member of Ph.D. Defense Committees for the following students:

- Tim Bertch
- La Rhonda T. Borum
- Kyongtaek Kevin Mun
- John Blackwood
- Brian Gerard Woods
- Yufei Hu
- Sufi Rizwan Ahmed
- Chichang Zhang
- Yuhong Cai
- Halah Azari
- Steven Edward Bullock
- Candi Hudson
- Ladan Mohaddes Ardabili
- Keimasi, Mohammadreza
- Paul Greg Oberson
- Xin Zhang (2006) Georgia Tech

- Yingli Fu (2007) (Bioengineering)
- Yuliang Deng (2007) (Mechanical Engineering)
- Arthur Von Wald Cresce (2007) (Bioengineering)
- Marjan Alaghmand (2007) (Chemistry)
- Wonjoo Lee (2009) (Materials Engineering)
- Janiak, Daniel (2009) (Bioengineering)
- Ghookah, Mohamed (2009) (Mechanical Engineering)
- Pierre, Heather St. (2009) (Chemical Engineering)
- Min Jia's (2009) (Chemistry and Biochemsitry)

Advisor to Post-Doctoral Associate

- Prof. Yuriy A. Zaikin- Fulbright Research Award (2000-2001)
- Dr. Daniel Schmelling, 1996-1997
- Dr. Ali Tafti, 1995-1996
- Dr. Eliezer Goldfeiz, 1994-1996
- Dr. Byung-Nam, Kim (2007-2008)
- Dr. Yongxia Sun (2007-2008)
- Dr. Ali Mohamed (2009-2010)
- Dr. Joon-Hyuk Yang, (2008-2010)
- Dr. Mahnaz Chaychian (2007-2010)

4. SERVICE

a. Professional National and International Activities

- **Chairman (1993-2001):** ASTM-E-10 On Nuclear Technology and Applications, Subcommittee E10-01-R "Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing". Scope: This guide provides the basis for selecting and calibrating dosimetry systems used to measure absorbed dose in gamma-ray or X-ray fields and in electron beams used for radiation processing. It discusses the types of dosimetry systems that may be employed during calibration or on a routine basis as part of quality assurance in commercial radiation processing of products. This guide also discusses interpretation of absorbed dose and briefly outlines the uncertainties associated with the dosimetry measurements. The details of the calibration of the analytical instrumentation are addressed in individual dosimetry system standard practices. Published in ASTM- "Nuclear, Solar, and Geothermal Energy, ASTM, 12.02, 685-696, 1998.

- Member of Advisory Committee for the Third International Symposium on ESR Dosimetry and Applications, Gaithersburg, MD, Sponsored by

National Institute of standards and Technology (NIST), October 14-18, 1991.

- Co-Chairman of the Second International Workshop on Dosimetry for Radiation Processing, University of Maryland at College Park, Sponsored by ASTM and NIST, October 6-11, 1991.

- Member of National Science Foundation (NSF) Panel-Bioengineering and Environmental Systems Division, 1996.

- Member of IAEA- Vienna, AUSTRIA Consulting Committee for " The use of radiation processing for sterilization or decontamination of pharmaceuticals and pharmaceutical products", 1998-2002

- Organizing an international- National Science Foundation (NSF)-sponsored workshop on "Determination of optimum radiolytic treatment methodologies for remediation of PCBs contaminated sites". University of Maryland at College Park, November 15-17, 1999.

- Expert for International Atomic Energy Agency (IAEA)-Vienna, AUSTRIA (1997-2000)

- Member of International Atomic Energy Agency IAEA- Vienna, AUSTRIA Research Co-ordination Committee for "Post-irradiation stability of radiation sterilized medical plants", 2000-2002

- Organizing International Atomic Energy Agency (IAEA)-sponsored Vienna, AUSTRIA workshop on" Post-irradiation stability of radiation sterilized medical implants", University of Maryland at College Park, August 29- September 1, 2000.

- Member of the International Committee for the "Fourth International Workshop on Dosimetry for Radiation Processing, Bahia Resort hotel, San Diego, CA, October 22-27,2000.

- Member of the National Academy of Sciences Workshop for "Ensuring the Safety of U.S. Mail ", Washington, D.C., November 14, 2001

- Member of the DOE-Nuclear Energy Research Advisory Committee (NERAC)-University Research Infrastructure Workshop, Chicago, July 16-17, 2001.

- Member of DOE-Nuclear Energy Research Initiative (NERI)-Peer Review -Panel, June 6-7, 2002.

- Organizing International Atomic Energy Agency (IAEA)- Vienna, AUSTRIA Consultants Meeting on “The preparation of technical report on new analytical techniques of understanding radiation effects in materials”, July 22-25, 2002.

- Chair, “Session I: Standards & Methods in high-Dose applications”, 11th Annual Meeting, Council on Ionizing Radiation Measurements and standards (CIRM), October 21-23, 2002.

- Member of Peer and Merit Review Panel of DOE-University Reactor Instrumentation Program-February, 2004.

- President of the Council of ionizing Radiation and Measurements (CIRMS), October 2005-2006. CIRMS was founded and has been sponsored by NIST. It draws together experts involved in all aspects of ionizing radiation to discuss, review and assess developments and needs in this field. Drawing upon expertise from government and national laboratories, agencies and departments, from the academic community and from industry, CIRMS has issued its third triennial report on "National Needs in Ionizing Radiation Measurements and Standards." Such needs are delineated in Measurement Program Descriptions (MPDs) that indicate the objective, state background information, define needed action items and resource requirements in terms of personnel and facilities.

- Member of National Science Foundation (NSF) Panel-Instrumentation for Materials Research-Division of Materials Research, May 2-3, 2005

- Chair, First Research Coordination Meeting on “Electron Beam Treatment of Organic Pollutants Contained in Gaseous Streams” , International Atomic Energy Agency (IAEA) Headquarter, Vienna, Austria, 23-27 May, 2005.

- Consulting on Building PhD program in Al Farabi Kazakh National University, Almaty, Kazakhstan, June 3-5, 2005

- Member of the International Organizing committee, 11th Tihany Symposium on Radiation chemistry, Eger, Hungary, August 26-31, 2006.

- President, USA-Council on ionizing Radiation Measurements and Standards (CIRMS), 2005-2006.
- Member of the international committee of 8th International Symposium on Ionizing Radiation and Polymers, Brazil, October, 2008

- Member of the International Advisory Committee, International Conference on Recent Developments and Applications of Nuclear Technology, Bialowieza, Poland, 15-17 September 2008

- International Atomic Energy Agency (IAEA)- Mission to the Korean Atomic Energy Institute (KAERI), "utilzation of mobile EB for the environmental field", October- 24-31, 2009,

- Member of Nuclear Energy University Program (NEUP)-Reviewer Panel, (2010)

- President, 9th International Symposium on Ionizing Radiation and Polymers, USA, October, 2010

b. Campus

Departmental

Radiation Engineering Research and Teaching Facilities

- Director, Radiation Facilities-
- Director, Maryland University Training Reactor (MUTR)
- Nuclear Regulatory Commission (NRC) Licensed Senior Reactor Operator (SRO), License No. SOP-70262

Radiation Facilities Description

The radiation facilities (self-supported) consist of three major radiation sources (a 2-9 MeV) electron accelerator, a 10 MeV, 18kW electron beam accelerator, a 250 kW TRIGA nuclear reactor, Co-60 gamma source (Licensed up to132 kCi Co-60), and associated laboratories. The electron accelerators and Co-60 gamma facilities have extensively been used in numerous research areas.

Radiation Facilities in Support of Research:

The radiation facilities are used intensively for the following basic and applied research activities:

- Radiation-induced modification of polymeric materials
- Radiation-induced formation nano gels and nano composites.
- Electron, gamma , and Neutron dosimetry

- Environmental remediation of polychlorinated biphenyls (PCBs) in transformer oil and sediments.
- Radiation effects on electronics
- Radiation –sterilization of plasma and bloods

- Radiation effects on biological systems (DNA, fatty acids micellar systems and lyposomes)
- The role of antioxidants in the biological systems (Vitamins E and C, Beta-Carotenes, and Bilirobines)
- Radiation-induced polymerization
- Nuclear medicine (Boron Capture Therapy)
- Radiation-induced polymerization
- Radiation-induced synthesis of nano composities
- Radiation-induced grafting
- Radiation-induced crosslinking of ultra high molecular weight polyethylene
- Radiation-induced synthesis of nanogel

Radiation Facilities in Support of Teaching:

The radiation facilities are used for the following nuclear, materials, and reliability engineering courses:

- "Radiation Engineering" ENNU 655
- "Nuclear Technology Laboratory" ENNU 440
- "Introduction to Electronic Packaging Materials" ENMA 489C
- "Degradation of Materials" ENNU 489A cross listed with Degradation of Materials" ENMA 698D
- "Radiation Effects in Polymers"-ENMA 698R
- ENMA 310, Laboratory for Materials, (Coordinator: Prof. Luz Martinez-Miranda and Prof. Robert. Briber)
- ENMA 311, Laboratory for Materials (Coordinator: Prof. Luz Martinez-Miranda)
- ENMA 489D (Cross-listed with ENRE 489D), Applied Reliability Engineering II
- ENNU 320, Reactor Operation.
- Radio Chemistry CHEM 403 (Department of Chemistry)
- Nuclear Physics and Society HONR 228Q (Department of Physics)
- Radiation Effects in Materials ENMA422

MUTR-Relicensing: Managing the relicensing of the Maryland University Training Reactor (MUTR) for the next twenty years (License No. R-70, Docket No. 50-166). This process took more than a year to be completed. The relicensing documents were prepared according to the "Nuclear Regulatory Commission-Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors-NUREG-1537, 1996". The relicensing documents include the following:

a. All reactor procedures

b. Safety analysis report
c. Technical specifications
d. Requalification/training program
e. Environmental report
f. Emergency preparedness plan

- In addition to teaching, the reactor has been used for the last three years in providing radiation service to private companies and federal agencies. Typically, the MUTR has provided service for schools throughout the state of Maryland, the District of Columbia, and Northern Virginia.

Department Committee:

- Member of the Reactor Safety committee 1997-present
- Member of the Searching committee for faculty (nano-metal structure), 1999-2000
- Member of the Department-Merit Pay committee, Academic year 1999-2000.
- Searching Committee for Director of Business and Administration for the Department of Materials and Nuclear Engineering (2001)
- Member of Department of Materials and Nuclear Engineering Graduate Admissions (2002-Present)
- Chair, APT-Committee for Dr. Otto Wilson's promotion to Associate Professor with Tenure. (2002)
- Chair, Department Organization Committee (2004)
- Member of Searching Committee for faculty position in the MSE (nano and bio position) (2004)
- Environmental Compliance Officer, 2004-Present
- Member of APT –Committee for Dr. R. Ankem's promotion to full professor 2005-2006.
- Chair: PhD qualifying Exam (2007)
- Member of the Department-Merit Pay committee, Academic year 2007-2008

College

- Member of bio-engineering planning committee, Bioengineering Program, Chair: Professor W. E. Bentley. (April 1999)
- Member of "The Center for Optoelectronic Devices, Interconnects, and Packaging" (2001)
- Member of the College of Engineering-Curriculum, and Courses (PCC) Committee 2003-July, 2008
- Member of the College Appointment, Promotion, and Tenure (APT) committee (2006-2009)

University

- Member of University of Maryland Radiation Safety Committee (1997-Present)
- Member of the Searching Committee for radiation Safety Officer May, 2000
- Member of the Campus Biological and Chemical Hygiene (BACH) committee (BACH) 2003-Present
- UMCP Compliance Officer, Department of Environmental Safety (April 2004-present)