

DAVID A. ZAHAROFF

Interim Head and Associate Professor
21st Century Professorship in Biomedical Engineering
Department of Biomedical Engineering
120 John A. White, Jr. Engineering Hall
Fayetteville, AR 72701
Campus: (479) 575-2005 or (479) 575-8610
Lab: (479) 575-5221
zaharoff@uark.edu

PERSONAL STATEMENT

I direct an interdisciplinary, translational immunoengineering program focusing on the design, development and evaluation of novel delivery systems for cancer vaccines and immunotherapies. Our delivery systems often exploit both natural and engineered biomaterials to control the context in which antigens and/or cytokines are introduced to the immune system. Controlling delivery allows us to: (1) manipulate the duration and intensity of antitumor immune responses, (2) limit systemic side effects of immune response modifiers, and (3) overcome tumor-mediated immune suppression.

1. EMPLOYMENT & AFFILIATIONS

2015-Present Interim Head, Department of Biomedical Engineering
University of Arkansas, Fayetteville, AR

2015-Present Associate Professor, Department of Biomedical Engineering
University of Arkansas, Fayetteville, AR

2009-2015 Assistant Professor, Department of Biomedical Engineering (2012-2015)
Department of Biological Engineering (2009-2012)
University of Arkansas, Fayetteville, AR

2014-Present Adjunct Assistant Professor, Department of Urology
University of Arkansas for Medical Sciences, Little Rock, AR

2010-Present Member, Winthrop P. Rockefeller Cancer Institute
University of Arkansas for Medical Sciences, Little Rock, AR

2009-Present 21st Century Endowed Professorship in Biomedical Engineering
University of Arkansas, Fayetteville, AR

2002 Graduate Research Intern,
Vical, Inc., San Diego, CA

1995-1996 Summer Intern
ALCOA, New Kensington, PA

2. EDUCATION

- 2004-2009 Postdoctoral Fellow in Tumor Immunology (Mentors: J. Greiner and J. Schlom)
Laboratory of Tumor Immunology and Biology
National Cancer Institute, Bethesda, MD
- 2003-2004 Postdoctoral Fellow in Gene Delivery (Mentor: Fan Yuan)
Department of Biomedical Engineering
Duke University
- 2002 Ph.D. Biomedical Engineering, Certificate in Biomolecular and Tissue
Engineering (Advisor: Fan Yuan)
Duke University
- 1997 B.S. Mechanical Engineering
University of Illinois at Urbana-Champaign

3. HONORS & AWARDS

- 2015 Rising Star Faculty Award, College of Engineering, University of Arkansas
- 2015 Top 15 funded investigators of 2015, University of Arkansas
- 2013, 2014 Outstanding Researcher Award, Dept. of Biomedical Engineering, University of
Arkansas
- 2012 Faculty Gold Medal, Office of Nationally Competitive Awards, University of
Arkansas
- 2012-2015 Outstanding Mentor, Office of Nationally Competitive Awards, University of
Arkansas
- 2012 Outstanding Teaching Award, Dept. of Biological and Agricultural Engineering,
University of Arkansas
- 2010 NCI Transition Career Development Award (K22)
- 2009 21st Century Endowed Professorship of Biomedical Engineering
- 2008, 2009 NIH Fellows Award for Research Excellence (FARE)
- 2007, 2008 Federal Technology Transfer Award
- 2006 NCI Director's Career Development Innovation Award
- 2005 Ruth L. Kirschstein National Research Service Award (F32)
- 1998-2002 Center for Biomolecular and Tissue Engineering NIH Predoctoral Fellow (T32)
- 1997 Tau Beta Pi Honor Society
- 1993-1997 Edmund James Scholar

4. PROJECT FUNDING

4.1 CURRENT FUNDING

NIH R01CA172631, *Biopolymer-based strategies for local delivery of cytokine therapeutics*, 6/3/2014-5/31/2019, \$1,511,348 (Role: PI)

NIH R15CA176648, *Intravesical Chitosan/IL-12 Immunotherapy for Bladder Carcinoma*, 3/01/14 – 2/28/17, \$416,897 (Role: PI)

Arkansas Breast Cancer Research Program, *Restoring Immune Function Following Breast Tumor Resection*, 9/01/15-8/31/16, \$73,893 (Role: PI)

Arkansas Biosciences Institute, *Immune-related Prognostic Markers for Life-Threatening Breast Cancers*, 7/01/14-5/31/15, \$25,780 (Role: PI)

Arkansas Science and Technology Authority, 15-B-14, *Non-specific IL-12-Chitosan Bioconjugates for Immunotherapy of Solid Tumors*, 09/19/2014 – 09/18/2015, \$38,726 (Role: PI)

College of Engineering, University of Arkansas, Engineering Research and Innovation Seed Funding, *Identifying metabolic hallmarks of breast cancer metastases*, 07/01/2015 - 06/30/2016, \$24,857 (Role: Co-PI)

4.2 COMPLETED FUNDING

Arkansas Biosciences Institute and sub-project for NIH P30 GM103450, *Role of Heparin in Interleukin-12 Function*, 7/01/13-5/31/15, \$71,239 (Role: PI)

Arkansas Breast Cancer Research Program, *Development of an autologous tumor cell vaccine for TNBC*, 7/01/13-6/30/14, \$75,000 (Role: PI)

NIH K22CA131567, *Chitosan-based Delivery and Immunopotential of Cancer Vaccines*, 6/01/10-5/31/13, \$510,032 (Role: PI)

Arkansas Biosciences Institute and sub-project for NIH P30 GM103450, *Overexpression and Purification of Recombinant IL-12 in Pichia Pastoris*, 7/01/12-5/31/13, \$69,115 (Role: PI)

Arkansas Breast Cancer Research Program, *Pilot investigation of neoadjuvant chitosan/IL-12 immunotherapy prior to resection*, 7/01/11-6/30/12, \$73,086 (Role: PI)

Women's Giving Circle, *Neoadjuvant Chitosan/IL-12 Immunotherapy for Control of Breast Cancer Metastasis*, 7/01/11-6/30/12, \$15,000 (Role: PI)

Arkansas Biosciences Institute, *Biological Validation of Self-Assembled Multimodal Nanotheranostics*, 7/01/11-5/31/12, \$47,000 (Role: PI)

Arkansas Biosciences Institute, *Purchase of a Lumina XR in vivo imaging system*, 7/1/10-1/31/11, \$204,109 (Role: PI).

Arkansas Biosciences Institute, *Development of novel chitosan-based vaccines for the treatment of Meth Addiction*, 7/1/09-6/30/10, \$49,302 (Role: Co-PI)

NIH F32CA117668, *Mucosal Delivery Strategies for Cancer Vaccines*, 3/01/2005-1/31/2008, \$149,172 (Role: PI).

5. PUBLICATIONS IN PEER-REVIEWED JOURNALS

27. Smith, S.G., Koppolu, B., Ravindranathan, S., Kurtz, S.L., Yang, L., Katz, M.D., **Zaharoff, D.A.** Intravesical Chitosan/IL-12 Immunotherapy Induces Tumor-Specific Systemic Immunity against Bladder Cancer. *Cancer Immunology Immunotherapy*, 64(6):689-96, 2015.
26. Kurtz, S.L., Ravindranathan, S., **Zaharoff, D.A.** Current Status of Autologous Breast Tumor Cell-based Vaccines. *Expert Review of Vaccines*, 13(12):1439-1445, 2014.
25. Vo, J.L.N., Yang, L., Kurtz, S.L., Smith, S.G., Koppolu, B., Ravindranathan, S., **Zaharoff, D.A.** Neoadjuvant immunotherapy with chitosan and interleukin-12 to control breast cancer metastasis. *OncoImmunology*, 3(12): e968001, 2014.
24. Jayanthi, S., Koppolu, B., Smith, S.G., Jalah, R., Bear, J., Rosati, M., Pavlakis, G.N., Felber, B.K., **Zaharoff, D.A.**, Kumar, T.K.S. Efficient production and purification of recombinant human interleukin-12 (IL-12) overexpressed in mammalian cells without affinity tag. *Protein Expression and Purification*, 102:76-84, 2014.
23. Koppolu, B., Smith, S.G., Ravindranathan, S., Jayanthi, S., Kumar, T.K.S., **Zaharoff, D.A.** Controlling chitosan-based encapsulation for protein and vaccine delivery. *Biomaterials*, 35(14):4382-9, 2014.
22. Kim, J.-W., Galanzha, E.I., **Zaharoff, D.A.**, Griffin, R.J., Zharov, V.I. Nanotheranostics of Circulating Tumor Cells and Other Pathological Cells In Vivo. *Molecular Pharmaceutics*, 10(3):813-30, 2013.
21. Yang, L., **Zaharoff, D.A.** Role of chitosan co-formulation in enhancing interleukin-12 delivery and antitumor activity. *Biomaterials*. 34:3828-36, 2013.
20. Koppolu, B., **Zaharoff, D.A.** The effect of antigen encapsulation in chitosan particles on uptake, activation and presentation by antigen presenting cells. *Biomaterials*, 34:2359-69, 2013.
19. Heffernan, M.J., **Zaharoff, D.A.**, Fallon, J.K., Greiner, J.W. In vivo efficacy of a chitosan/IL-12 adjuvant system for protein-based vaccines. *Biomaterials*, 32(3):926-32, 2011.
18. **Zaharoff, D.A.**, Hance, K.W., Rogers, C.J., Schlom, J., Greiner, J.W. Intratumoral immunotherapy of established solid tumors with chitosan/IL-12. *Journal of Immunotherapy*, 33(7):697-705, 2010.
17. **Zaharoff, D.A.**, Hoffman, B.S., Hooper, H.B., Benjamin, C.J., Khurana, K.K., Hance, K.W., Rogers, C.J., Pinto, P.A., Schlom, J., Greiner, J.W. Intravesical immunotherapy of superficial bladder cancer with chitosan/IL-12. *Cancer Research*, 69(15):6192-9, 2009.
16. Hance, K.W., Rogers, C.J., **Zaharoff, D.A.**, Canter, D., Schlom, J., Greiner, J.W. The antitumor and immunoadjuvant effects of IFN-alpha in combination with recombinant poxvirus vaccines. *Clinical Cancer Research*, 15(7):2387-96, 2009.

15. Rogers, C.J., **Zaharoff, D.A.**, Hance, K.W., Perkins, S.N., Hursting, S.D., Schlom, J., Greiner, J.W. Exercise enhances vaccine-induced antigen-specific T cell responses. *Vaccine*, 26(42): 5407-15, 2008.
14. **Zaharoff, D.A.**, Henshaw, J.W., Mossop, B.J., Yuan, F. Mechanistic analysis of electroporation-induced cellular uptake of macromolecules. *Experimental Biology and Medicine*, 233(1):94-105, 2008.
13. Zeytin, H., Reali, E., **Zaharoff, D.A.**, Rogers, C.J., Schlom, J., Greiner, J.W. NK Cell Recruitment to Regional Lymph Nodes and Priming of Tumor-Specific Host Immunity. *Journal of Interferon and Cytokine Research*, 28(2):73-87, 2008.
12. **Zaharoff, D.A.**, Rogers, C.J., Hance, K.W., Schlom, J., Greiner, J.W. Chitosan solution enhances the immunoadjuvant properties of GM-CSF. *Vaccine*, 25(11):8673-8686, 2007.
11. Rogers, C. J., Berrigan D., **Zaharoff, D.A.**, Hance, K.W., Patel, A.C., Perkins, S.N., Schlom J., Greiner J.W., and Hursting, S.D. Exercise and calorie restriction differentially alter systemic and mucosal immunity. *Journal of Nutrition*, 138:115-122, 2008.
10. **Zaharoff, D.A.**, Rogers, C.J., Hance, K.W., Schlom, J., Greiner, J.W. Chitosan solution enhances both humoral and cell-mediated immune responses to subcutaneous vaccination. *Vaccine*, 25(11):2085-2094, 2007.
9. Henshaw, J.W., **Zaharoff, D.A.**, Mossop, B.J., Yuan, F. Electric field-mediated transport of plasmid DNA in tumor interstitium in vivo. *Bioelectrochemistry*, 71(2):233-42, 2007
8. Mossop, B.J., Barr, R.C., Henshaw, J.W., **Zaharoff, D.A.**, Yuan, F. Electric fields in tumors exposed to external voltage sources: Implication for electric field - mediated drug and gene delivery. *Annals of Biomedical Engineering*, 34(7):1564-1572, 2006.
7. McGuire, S.M., **Zaharoff, D.A.**, Yuan, F. Nonlinear dependence of hydraulic conductivity on tissue deformation during intratumoral infusion. *Annals of Biomedical Engineering*, 34(7):1173-1181, 2006.
6. Henshaw, J.W., **Zaharoff, D.A.**, Mossop, B.J., Yuan, F. A single molecule detection method for understanding mechanisms of electric-field mediated interstitial transport of genes. *Bioelectrochemistry*, 69: 248-253, 2006.
5. Mossop, B.J., Barr, R.C., **Zaharoff, D.A.**, Yuan, F. Electric fields within cells as a function of membrane resistivity – A model study. *IEEE Trans. Nanobioscience*, 3(3):225-231, 2004.
4. **Zaharoff, D.A.**, Yuan, F. Effects of pulse strength and pulse duration on in vitro DNA electromobility. *Bioelectrochemistry*, 62(1):37-45, 2004.
3. Zhang, L., Widera, G., Blecher, S., **Zaharoff, D.A.**, Mossop, B., Rabussay, D. Accelerated immune response to DNA vaccines. *DNA and Cell Biology*, 22(12):815-822, 2003.
2. **Zaharoff, D.A.**, Barr, R.C., Li, C.Y., Yuan, F. Electromobility of plasmid DNA in tumor tissues during electric field-mediated gene delivery. *Gene Therapy*, 9:1286-1290, 2002.
1. Lohr, F., Lo, D.Y., **Zaharoff, D.A.**, Hu K., Zhang, X., Li, Y., Zhao, Y., Dewhirst, M.W., Yuan, F., Li, C.-Y. Effective tumor therapy with plasmid-encoded cytokines combined with in vivo electroporation. *Cancer Research*, 61(8):3281-4, 2001.

6. INVITED SEMINARS

5. “Engineering Immunotherapies,” Department of Microbiology and Immunology, University of Arkansas for Medical Sciences, December 11, 2014, Little Rock, AR.

4. "Engineering Immunotherapies for Bladder and Breast Cancers," ARC Seminar Series, Harvard Medical School/Beth Israel Deaconess Medical Center, October 16, 2013, Boston, MA.
3. "Chitosan-based Particles for Cancer Vaccine and Immunotherapy Delivery," Third Arkansas Conference on Nanotechnology and Healthcare, April 7, 2011, Morrilton, AR.
2. "Chitosan-based Delivery Systems for Cancer Vaccines and Immunotherapies," Winthrop P. Rockefeller Cancer Institute Forum, October 4, 2010, Little Rock, AR.
1. "Engineering Vaccines and Immunotherapies for Cancer," The George Washington University Institute for Biomedical Engineering Colloquium, Washington, D.C., March 26, 2008.

7. BOOK CHAPTERS

2. **Zaharoff, D.A.**, Heffernan, M.J., Fallon, J.A., and Greiner, J.W. "Preclinical and Clinical Use of Chitosan and Derivatives for Biopharmaceuticals: From Preclinical Research to the Bedside" in Chitosan-Based Systems for Biopharmaceuticals: Delivery, Targeting and Polymer Therapeutics. Eds: Sarmento, B, and das Neves, John Wiley & Sons, Ltd, Chichester, UK, 525-541, 2012.
1. McGuire, S.M., **Zaharoff, D.A.**, Yuan, F. "Interstitial Transport of Nucleic Acids in Solid Tumors" invited chapter in Pharmaceutical Perspectives of Nucleic Acid-based Therapeutics. Eds. Mahato, R.I., Kim, S.W., Taylor & Francis, New York, 434-454, 2002.

8. CONFERENCE PRESENTATIONS & PROCEEDINGS

49. Nguyen, K., Koppolu, B., Smith, S.G., Ravindranathan, S., Siddiqui, M.Z., **Zaharoff, D.A.** Heparin-based delivery of IL-12 immunotherapy differs between mouse and human. Biomedical Engineering Society (BMES) Annual Meeting, October 7-10, 2015, Tampa, FL. (Poster Presentation)
48. Washispack, S.Q., Lowry, E.D., **Zaharoff, D.A.** Localized Immunotherapy Delivery Using Injectable in situ Forming Chitosan Hydrogel. Biomedical Engineering Society (BMES) Annual Meeting, October 7-10, 2015, Tampa, FL. (Poster Presentation)
47. Ravindranathan, S., Smith, S.G., Koppolu, B., Kurtz, S., **Zaharoff, D.A.** Endotoxin Contamination in Chitosan and Its Effect on Immune Response. Biomedical Engineering Society (BMES) Annual Meeting, October 22-25, 2014, San Antonio, TX. (Poster Presentation)
46. Lowry, E., Wallace, C., Koppolu, B., Smith, S.G., **Zaharoff, D.A.** Novel Chitosan-Based Hydrogel for Controlled Release of Anti-Tumor Cytokines. Biomedical Engineering Society (BMES) Annual Meeting, October 22-25, 2014, San Antonio, TX. (Poster Presentation)
45. Smith, S.G., Ravindranathan, S., Nguyen, K., **Zaharoff, D.A.** Mathematical Model of Protein Delivery Within the Urinary Bladder. Biomedical Engineering Society (BMES) Annual Meeting, October 22-25, 2014, San Antonio, TX. (Poster Presentation)
44. Mertz, M., Koppolu, B., **Zaharoff, D.A.** Characterization of Novel Chitosan/Polyelectrolyte Nanoparticles. Biomedical Engineering Society (BMES) Annual Meeting, October 22-25, 2014, San Antonio, TX. (Poster Presentation)

43. Walker, C., Smith, S.G., **Zaharoff, D.A.** Exploring Biomarkers for Point of Care Bladder Cancer Detection. Biomedical Engineering Society (BMES) Annual Meeting, October 22-25, 2014, San Antonio, TX. (Poster Presentation)
42. Smith, S.G., Koppolu, B., Ravindranathan, S., Kurtz, S., Yang, L., Katz, M., **Zaharoff, D.A.** Intravesical Chitosan/IL-12 Immunotherapy of Orthotopic Bladder Cancer Induces Tumor Specific Systemic Immunity. South Central Section of the American Urological Society Annual Meeting, October 8-11, 2014, Rancho Mirage, CA (Podium Presentation).
41. Smith, S.G., **Zaharoff, D.A.** Intravesical Chitosan/IL-12 Immunotherapy of Orthotopic Bladder Cancer Induces Tumor Specific Systemic Immunity. Arkansas Academy of Sciences Annual Meeting, April 2014, Searcy, AR. (Podium Presentation).
40. Perlow, H., Yang, L., **Zaharoff, D.A.** Pancreatic cancer immunotherapy with chitosan/IL-12, AACR Annual Meeting, April 5-9, 2014, San Diego, CA. (Poster Presentation)
39. Wallace, C.W., Koppolu, B., Smith, S.G., **Zaharoff, D.A.** Novel Chitosan-Based Hydrogel for Localized Cytokine Immunotherapy, AACR Annual Meeting, April 5-9, 2014, San Diego, CA. (Poster Presentation)
38. Smith, S.G., Yang, L., **Zaharoff, D.A.** Intravesical Chitosan/IL-12 Immunotherapy of Orthotopic Bladder Cancer Induces Tumor Specific Systemic Immunity, Biomedical Engineering Society (BMES) Annual Meeting, September 25-28, 2013, Seattle, WA. (Podium Presentation)
37. Ravindranathan, S., Koppolu, B., Smith, S.G., Kurtz, S.L., **Zaharoff, D.A.** Functional characterization of chitosan. Biomedical Engineering Society (BMES) Annual Meeting, September 25-28, 2013, Seattle, WA. (Poster Presentation)
36. Kumar, S., Koppolu, B., Wallace, C., **Zaharoff, D.A.** Effects of Chitosan Modifications on Protein Release, Biomedical Engineering Society (BMES) Annual Meeting, September 25-28, 2013, Seattle, WA. (Poster Presentation)
35. Kurtz, S.L., Vo, J.L.N., Yang, L., Koppolu, B., Ravindranathan, S., Smith, S.G., **Zaharoff, D.A.** In situ Vaccination with Chitosan/IL-12 Generates Tumor Specific Immunity in Triple Negative Breast Cancer, Breast Cancer Challenge Conference, July 26-27, 2013, Branson, MO. (Poster Presentation)
34. Kerr, R., Webb, N., Koppolu, B., **Zaharoff, D.A.**, Kumar, T.K.S. The Role of Heparin in Acidic Fibroblast Growth Factor Signaling, Protein Society Annual Symposium, July 20-23, 2013, Boston, MA. (Poster Presentation)
33. Smith, S.G., Yang, L., Vo, J.L.N., Ravindranathan, S., Koppolu, B., Kurtz, S., **Zaharoff, D.A.** Intravesical Immunotherapy with Chitosan and Interleukin-12 Induces Systemic Tumor-Specific Immunity, American Urological Association (AUA) Annual Meeting, May 4-8, 2013, San Diego, CA. (Moderated Poster)
32. Koppolu, B., **Zaharoff, D.A.** Encapsulation of antigen in chitosan particles enhances activation and antigen specific response by antigen presenting cells, Society for Biomaterials Annual Conference, April 10-13, 2013, Boston, MA. (Poster Presentation)
31. Haggard, B.E., Bailey, I.M., **Zaharoff, D.A.** What Happens When You Mix Chitosan and Poultry Litter?, Livestock and Poultry Environmental Learning Center's From Waste to Worth Conference, April 1-5, 2013, Denver, CO.
30. Vo, J.L.N., Yang, L., **Zaharoff, D.A.** Intratumoral Chitosan/IL-12 Neoadjuvant to Tumor Resection Reduces Breast Cancer Metastasis, SITC Annual Meeting, October 26-28, 2012, North Bethesda, MD. (Poster Presentation)

29. Smith, S.G., Yang, L., **Zaharoff, D.A.** Intravesical Treatment of Orthotopic Bladder Cancer with Chitosan/IL-12 Induces Systemic Tumor-Specific Immunity, SITC Annual Meeting, October 26-28, 2012, North Bethesda, MD. (Poster Presentation)
28. **Koppolu, B., Zaharoff, D.A.** Chitosan particle based delivery systems for antigen delivery and inflammatory stimulus. BMES Annual Conference, October 24-27, 2012, Atlanta, GA. (Poster Presentation)
27. **Smith S.G., Jayanthi, S., Koppolu, B., Thallapuram, S.K., Zaharoff, D.A.** Chitosan's Milieu Alters its Interaction with Protein Biologics. BMES Annual Conference, October 24-27, 2012, Atlanta, GA. (Poster Presentation)
26. **Vo, J.L.N, Zaharoff, D.A.** Intratumoral Chitosan/Interleukin-12 Immunotherapy Reduces Breast Cancer Metastasis, AACR Annual Meeting, March 31-April 4, 2012, Chicago, IL. (Poster Presentation; *Thomas J. Bardos Science Education Awardee*)
25. **Vo, J.L.N, Zaharoff, D.A.** Chitosan/Interleukin-12 Neoadjuvant Therapy for Control of Breast Cancer Metastasis, BMES Annual Conference, October 12-15, 2011, Hartford, CT. (Poster Presentation)
24. **Koppolu, B., Zaharoff, D.A.** Optimization of Chitosan Particles for Immunotherapy, BMES Annual Conference, October 12-15, 2011, Hartford, CT. (Poster Presentation)
23. **Heffernan, M.J., Zaharoff, D.A., Hance, K.W., Rogers, C.J., Schlom, J., Greiner, J.W.** Chitosan and Interleukin-12 Enhance the Antigen-Specific T Cell Response of a Protein-Based Vaccine, Society For Biomaterials Annual Meeting and Exposition, April 13-16, 2011, Orlando, FL. (Poster Presentation)
22. **Koppolu, B., Zaharoff, D.A.** Effect of formulation factors on chitosan particle properties, BMES Annual Conference meeting, October 7-10, 2010, Austin, TX. (Poster Presentation)
21. **Zaharoff, D.A.,** Hance, K.W., Rogers, C.J., Schlom, J., Greiner, J.W. Intratumoral immunotherapy with chitosan/IL-12 eradicates established tumors and elicits durable, tumor-specific immune responses. International Society for Biological Therapy of Cancer Annual Meeting, Washington, DC. October 29-31, 2009. (Poster Presentation)
20. **Zaharoff, D.A.,** Hoffman, B.S., Hooper, H.B., Benjamin, C., Khurana, K.K., Hance, K.W., Rogers, C.J., Pinto, P.A., Schlom, J., Greiner, J.W. Intravesical chitosan/IL-12 immunotherapy for the management of superficial bladder cancer. Biomedical Engineering Society Annual Conference, Pittsburgh, PA. October 7-10, 2009. (Poster Presentation)
19. **Zaharoff, D.A.,** Hance, K.W., Rogers, C.J., Schlom, J., Greiner, J.W. Locally administered IL-12 formulated in a biocompatible biopolymer eradicates established orthotopic bladder tumors. 6th International Cancer Vaccine Symposium, New York, NY. October 28-30, 2008. (Poster Presentation)
18. **Rogers, C.J., Zaharoff, D.A.,** Hance, K.W., Perkins, S.N., Schlom, J., Hursting, S.D., Greiner, J.W. Obesity-induced impairments in innate and adaptive immune responses are differentially altered by exercise and dietary restriction. AACR Frontiers in Cancer Prevention Research Meeting, National Harbor, MD. November 16-19, 2008. (Poster Presentation)
17. **Zaharoff, D.A.,** Hoffman, B.S., Hooper, H.B., Benjamin, C., Khurana, K.K., Hance, K.W., Rogers, C.J., Pinto, P.A., Schlom, J., Greiner, J.W. Immunotherapy of superficial bladder carcinoma with intravesical chitosan/IL-12. American Association for Cancer Research, San Diego, CA. April 14, 2008. (Poster Presentation)
16. **Rogers, C.J.,** Hance, K.W., **Zaharoff, D.A.,** Perkins, S.N., Hursting, S.D., Schlom, J., Greiner, J.W. Exercise, alone and in combination with an anti-CEA vaccine, reduces

- pancreatic tumor cell growth and enhances survival in mice. American Association for Cancer Research, San Diego, CA. April 14, 2008. (Poster Presentation)
15. **Zaharoff, D.A.**, Rogers, C.J., Hance, K.W., Schlom, J., Greiner, J.W. Chitosan Solution, a Novel Adjuvant/depot for Subcutaneous Vaccination, Enhances both Humoral and Cell-Mediated Immune Responses. Modern Vaccines/Adjuvants Formulation, Dublin, Ireland. November 14, 2007. (Podium Presentation)
 14. **Zaharoff, D.A.**, Rogers, C.J., Hance, K.W., Schlom, J., Greiner, J.W. Chitosan Nanoparticles as Novel Platform for Cancer Vaccine Delivery. Nanobiology Think Tank, Frederick, MD. May 24, 2007. (Podium Presentation)
 13. **Zaharoff, D.A.**, Rogers, C.J., Hance, K.W., Schlom, J., Greiner, J.W. Exploring chitosan as a dependent depot/adjuvant for vaccine delivery. Translational Immunology Related to Cancer, Bethesda, MD. September 22-23, 2005. (Poster Presentation)
 12. Hance, K.W., Rogers, C.J., **Zaharoff, D.A.**, Schlom, J., Greiner, J.W. Pancreatic Cancer: Target for Immune-Based Intervention? Cancer Epidemiology Biomarkers and Prevention, 14(11): 2723S-2723S, 2005.
 11. **Zaharoff, D.A.**, Rogers, C.J., Hance, K.W., Schlom, J., Greiner, J.W. Exploring Chitosan as a Depot/Adjuvant for Vaccine Delivery, Translational Immunology Related to Cancer, Bethesda, MD, 2005. (Poster Presentation)
 10. Rogers, C.J., Berrigan, D., **Zaharoff, D.A.**, Hance, K.W., Perkins, S.N., Hursting, S.D., Greiner, J.W., Schlom, J.. Changes in Energy Balance Selectively Enhance Mucosal Immune Function in C57BL/6 Mice. Cancer Epidemiology Biomarkers and Prevention, 14(11): 2747S-2747S, 2005.
 9. Henshaw, J.W., **Zaharoff, D.A.**, Mossop, B.J., Yuan, F. In Vivo Electric Field-Mediated Transport of Plasmid DNA in Tumor Interstitium. ASME Summer Bioengineering Conference, Vail, CO. June 23, 2005. (Podium Presentation)
 8. **Zaharoff, D.A.**, Yuan, F. Transmembrane transport of marker molecules and cell membrane kinetics during electroporation. American Society of Gene Therapy Annual Conference, Washington, D.C. June 5, 2003. (Poster Presentation)
 7. **Zaharoff, D.A.**, Yuan, F. Effects of pulse strength and pulse duration on plasmid DNA electromobility. Biomedical Engineering Society Annual Conference. Houston, TX. October, 24, 2002. (Podium Presentation)
 6. **Zaharoff, D.A.**, Yuan, F. Influence of pulse strength and pulse duration on plasmid DNA electromobility in agarose gels. American Society of Gene Therapy Annual Conference, Boston, MA. June 7, 2002. (Poster Presentation)
 5. **Zaharoff, D.A.**, Barr, R.C., Li, C.Y., Yuan, F. Transport of plasmid DNA in agarose gels and tumor tissues subjected to pulsed high electric fields. Biomedical Engineering Society Annual Conference, Durham, NC. October, 6, 2001. (Podium Presentation)
 4. **Zaharoff, D.A.**, Barr, R.C., Li, C.Y., Yuan, F. Characterization of cell membrane permeability and resealing kinetics during electroporation. Biomedical Engineering Society Annual Conference, Durham, NC. October, 6, 2001. (Poster Presentation)
 3. **Zaharoff, D.A.**, Barr, R.C., Li, C.Y., Yuan, F. Mobility of plasmid DNA under pulsed high electric fields. American Society of Mechanical Engineering 2001 Summer Bioengineering Conference, Snowbird, UT. June, 28, 2001. (Podium Presentation)
 2. Yuan, F., **Zaharoff, D.**, Zhang, X.-Y., Lohr, F., Dewhirst, M.W., Li, C.-Y. Delivery of plasmid DNA through intratumoral infusion and electroporation. Advances in Bioengineering, V. 48, ASME-BED, 2000.

1. **Zaharoff, D.A.**, Barr, R.C., Li, C.Y., Yuan, F. Mobility of plasmid DNA subjected to pulsed electric fields. Biomedical Engineering Society Annual Conference, Seattle, WA. October, 12, 2000. (Poster Presentation).

9. INTELLECTUAL PROPERTY

9.1 INVENTION DISCLOSURES

Zaharoff, D.A., Kumar, T.K.S., Koppolu, B., Jayanthi, S., Smith, S.G. Cytokine-Chitosan Bioconjugates and Methods of Using the Same. Filed on 5/29/2014

Kumar, T.K.S., **Zaharoff, D.A.**, Jayanthi, S., Koppolu, B., Smith, S.G. Method for purification of cytokines. Filed on 6/20/2014

Zaharoff, D.A., Ravindranathan, S. Method for eliminating endotoxin contaminants from chitosan. Filed on 7/16/14

9.2 PATENT APPLICATIONS

Kumar, T.K.S., **Zaharoff, D.A.**, Jayanthi, S., Koppolu, B., Smith, S.G. Methods for Production and Isolation of Interleukin-12, U.S. Patent Application No. 62/035,263

Zaharoff, D.A., Kumar, T.K.S., Koppolu, B., Jayanthi, S., Smith, S.G. Cytokine-Chitosan Bioconjugates and Methods of Using the Same. U.S. Patent Application No. 62/006,114

Zaharoff, D.A., Haggard, B.E., Bailey, I.M. Process for reducing water soluble elements using and amended animal manure fertilizer or litter. U.S. Patent Application No. 13/790,955, Pub. No. 20130255339

Zaharoff, D.A., Greiner, J.W., Schlom, J. Compositions and methods for chitosan enhanced immune response. U.S. Patent Application No. 12/442483, Pub. No. 20100150960
12/442483, PCT #: PCT/US07/20540

10. TEACHING & ADVISING EXPERIENCE

10.1 TEACHING

Fall 2015 BMEG 4623 Biomedical Transport Phenomena
 Course Developer/Instructor: 57 undergraduate students

Spring 2015 BMEG 5811/5810 Graduate Seminar II
 Course Developer/Instructor: 17 graduate students
 BMEG 450V/460V Honors Thesis/Individual Study
 Course Developer/Instructor: 5 undergraduate students

Fall 2014 BMEG 4623 Biomedical Transport Phenomena

- Course Developer/Instructor: 50 undergraduate students
 BMEG 5801 Graduate Seminar I
 Course Developer/Instructor: 17 graduate students
 BMEG 450V/460V Honors Thesis/Individual Study
 Course Developer/Instructor: 6 undergraduate students
- Spring 2014 BMEG 5103 Design and Analysis of Experiments in Biomedical Research
 Course Developer/Instructor: 9 graduate students
 BMEG 5811 Graduate Seminar II
 Course Developer/Instructor: 8 graduate students
 BMEG 560V Advanced Individual Study: Cancer Immunotherapy
 Course Developer/Instructor: 1 graduate student
- Fall 2013 BMEG 4623 Biomedical Transport Phenomena
 Course Developer/Instructor: 24 undergraduate students
 BMEG 5801 Graduate Seminar I
 Course Developer/Instructor: 16 graduate students
 CEMB 590V Special Topics in Cell and Molecular Biology: Cancer
 Immunotherapy
 Course Developer/Instructor: 1 graduate student
- Spring 2013 BMEG 5811 Graduate Seminar II
 Course Developer/Instructor: 10 graduate students
- Fall 2012 BMEG 4623 Biomedical Transport Phenomena (8 lectures)
 Instructor: 50 undergraduate students
- Spring 2012 BENG 4243/5243 Biomaterials
 Course Developer/Instructor: 4 graduate, 20 undergraduate students
- Fall 2011 BENG 4733 Transport Phenomena in Biological Systems
 Course Co-Developer/Co-Instructor: 31 undergraduate students
- Spring 2011 BENG 4243/5243 Biomaterials
 Course Developer/Instructor: 6 graduate, 10 undergraduate students
- Fall 2010 BENG 4733 Transport Phenomena in Biological Systems
 Course Co-Developer/Co-Instructor: 18 undergraduate students
- Spring 2010 BENG 5243 Biomaterials
 Course Developer/Instructor: 8 graduate students

10.2 POSTDOCTORAL SUPERVISION

Current

Bhanu prasanth Koppolu, Ph.D., 2014-present

Completed

Lirong Yang, Ph.D. 2011-2013

- Placed at Trinity College Dublin, Postdoc

Haitao Chen, Ph.D. 2009-2010

- Placed at Amgen, Scientist

10.3 GRADUATE STUDENT SUPERVISION

Current

Sean Smith (Ph.D. in progress)

Khue Nguyen (Ph.D. in progress)

Sruthi Ravindranathan (Ph.D. in progress)

Completed

Bhanu prasanth Koppolu (Ph.D. Biomedical Engineering, Dec 2013)

- Placed at University of Arkansas, Postdoc

Sruthi Ravindranathan (M.S. Biomedical Engineering, Dec 2013)

- Placed in Graduate School at University of Arkansas

Samantha Kurtz (M.S. Biomedical Engineering, Aug 2014)

- Placed in Graduate School at Tulane University

10.4 GRADUATE STUDENT COMMITTEES

Current

Daniel Falcon (Ph.D. Cell and Molecular Biology, expected Spring 2016)

Tyler Bowman (Ph.D. Electrical Engineering, expected Spring 2017)

Completed

Geoff Keeler (Ph.D. Cell and Molecular Biology, May 2015)

Geetika Bajpai (Ph.D. Cell and Molecular Biology, May 2015)

Tyler Bowman (M.S. Electrical Engineering, July 2014)

George Sakhel (M.S. Biological Engineering, July 2014)

Pantrika Krisanarungson (M.S. Biomedical Engineering, July 2014)

Shiloh Hurd (M.S. Biomedical Engineering, December 2013)

Pratyush Rai (Ph.D. Biomedical Engineering, July 2013)

Luke Brockman (M.S. Biomedical Engineering, May 2013)

Ahmed Hassan (Ph.D. Electrical Engineering, Dec 2010)

10.5 UNDERGRADUATE RESEARCH SUPERVISION

Current

Taylor Pauls, Biomedical Engineering (2013-Present)

Cassandra Walker, Biomedical Engineering (2013-Present)

- Awarded SURF grant for “Exploring Biomarkers for Point of Care Bladder Cancer Detection”

Seth Washispack, Biomedical Engineering (2013-Present)

- Awarded Honors College Research Grant for “Finding an Alternative Molecule to Form a Thermally Sensitive Hydrogel”

Kristina Maxwell, Biomedical Engineering (2014-Present)

- Awarded Honors College Research Grant for ““IFN-g and TNF-a immunomodulation of breast cancer cells”

Jack Baltz, Biomedical Engineering (2014-Present)

Shelby White, Biomedical Engineering (2015-Present)

Nasseer Nasseem, Biological Sciences (2015-Present)

Laura Mantooth, Biomedical Engineering (2015-Present)

Haven Frazier, Biological Sciences (2015-Present)

Completed

Haley Perlow, Biological Sciences (2011-2015)

- Awarded Honors College Research Grant for “Development of a Whole Tumor Cell Vaccine for Pancreatic Cancer”
- Awarded Honors College Research Grant for “Immune Stimulation and Suppression Blockade to Treat Pancreatic Cancer”
- Awarded Honors College Travel Grant to present research at AACR 2014 Annual Meeting
- Placed in graduate school at the University of Miami

Sushanth Kumar, Biomedical Engineering & Chemistry (2012-2015)

- Barry M. Goldwater Scholarship Honorable Mention
- Placed in graduate school at the University of Virginia

Michaela Mertz, Biomedical Engineering (2012-2015)

- Awarded Honors College Research Grant for “Characterization of Novel Chitosan/Polyelectrolyte Nanoparticles”
- Placed in graduate school at the University of Florida

Katie Wilson, Biomedical Engineering (2012-2015)

- Awarded Honors College Research Grant for “Intracellular trafficking of chitosan nanoparticle-based vaccines”
- Placed in graduate school at the University of Auckland, New Zealand

Zia Siddiqui, Biological Sciences (2013-2015)

- Awarded Honors College Research Grant for “Influence of Heparin on the Bioactivity of Interleukin-12”
- Placed in medical school at the University of Arkansas for Medical Sciences

Ethan Lowry, Biomedical Engineering (2014-2015)

- Awarded Honors College Research Grant for “Investigate heparin-based hydrogels as delivery method for interleukin-12 therapy”
- Awarded Honors College Research Grant for “Investigation of a Heparin-based Hydrogel for Anti-cancer Immunotherapy”

- Placed in graduate school at the University of Auckland, New Zealand
- Davis Ward, Biomedical Engineering (2014-2015)
- Placed in accelerated MBA program at the University of Arkansas Walton College of Business
- Rachel Kreuz, Biomedical Engineering (2013-2015)
- Annika Tabassum, Biomedical Engineering (2013-Present)
- Placed in graduate school at the University of Arkansas
- Saumil Shah (2010-2014)
- Awarded Honors College Research Grant for “An Analysis of Immune Responses to Different Chitosans”
 - Awarded Honors College Research Grant for “Preclinical Evaluation of Chitosan/IL-12 for Breast Cancer Immunotherapy”
- Angel Spigner, George Washington Carver Fellow from University of South Carolina (Summer 2014)
- Christopher Wallace, Chemistry (2011-2014)
- Awarded Honors College Grant for “Thiolated Chitosan as a Novel Vehicle for Intravesical Delivery”
 - Placed in medical school at the University of Arkansas for Medical Sciences
- Christopher Sonntag, Chemistry (2011-2014)
- Awarded SURF grant for “Cancer Immunotherapy by Inducing Intratumoral Apoptosis with Dichloroacetate”
 - Placed in medical school at the University of Arkansas for Medical Sciences
- Jimmy Vo (2010-2013)
- Most Outstanding Senior, College of Engineering
 - Most Outstanding Senior, Biomedical Engineering
 - Awarded Barry M. Goldwater Scholarship
 - Won AACR-Thomas J. Bardos Science Education Award to present research at AACR Annual Meeting
 - Awarded Research in Science and Engineering (RISE) Fellowship from the German Academic Exchange Service
 - Awarded SURF grant for “Control of Metastasis with Chitosan/IL-12-Based Immunotherapy”
 - Awarded SURF grant for “Evaluation of Chitosan/IL-12 Treatment Parameters Against Superficial Bladder Cancer”
 - Selected as “Outstanding Senior” in the Department of Biomedical Engineering and the College of Engineering
 - Placed in medical school at the University of Arkansas for Medical Sciences
- Kyle Lorentsen, Chemical Engineering (2010-2013)
- Placed in Graduate School at the University of Albany

10.6 FRESHMAN ENGINEERING HONORS COLLOQUIUM SUPERVISION

Current

Completed

- 2014-2015 Kayvan Afrasiabi and J. Austin Gattis, Correlation Between Chitosan Molecular Weight and Degradation in vivo (*Best Paper, Healthcare Track*)
- 2013-2014 Karam Sra and Melissa Auduong, Cytokine-based killing of tumor cells for use in a whole tumor cell vaccine (*Best Paper, Healthcare Track*)
- 2012-2013 Bryce Jones and Cassandra Walker, Using DNA to Detect Tissue Injury from Cancer, (*Best Poster and Best Presentation, Healthcare Track*)
Amanda Mills and Dan Pham, Effect of Radiation on the Growth of Various Tumor Cells
Maliha Bhatti and Katherine Trubitt, Effect of injection media on the release of protein therapeutics from chitosan nano/microparticles (*Best Paper, Healthcare Track*)
- 2011-2012 Michaela Mertz and Katie Wilson, Effect of Polymer Viscosity on the Retention of Therapeutic Proteins (*Best Poster, Healthcare Track*)
John Carradini and Griffin Sonaty, Design of a syringe for injectable hydrogels (*Best Presentation, Healthcare Track*)
- 2010-2011 Heidi Bingenheimer and Aaron Hancock, Chitosan-based Inhibition of Viral Infection (*Best Presentation, Healthcare Track*)

10.7 STUDENT CLUB ADVISING

Founding faculty advisor for UA BMES student chapter (2010-2014)

10.8 HIGH SCHOOL STUDENT RESEARCH SUPERVISION**Completed**

Annika Tabassum, Fayetteville High School Junior, Won 1st Place, Medicine and Health - 2010 Northwest Arkansas Regional Science and Engineering Fair, Best 11th grade project - 2010 Northwest Arkansas Regional Science and Engineering Fair; Outstanding Achievement - Arkansas State Science and Engineering Fair

11. PROFESSIONAL MEMBERSHIPS

- 2011-Present Society for Immunotherapy of Cancer (SITC)
- 2005-Present American Association for Cancer Research (AACR)
- 2000-Present Biomedical Engineering Society (BMES)
- 2013 American Urological Association (AUA)
- 2011 Society for Biomaterials (SFB)

12. SERVICE

12.1 PROPOSAL REVIEW

Oct 2016	NIH Study Section CII
Sept 2015	NIH Study Section ZRG1 OTC-N
Aug 2015	Susan G. Komen Postdoctoral Fellowship Pre-application Review Panel
Feb 2015	Susan G. Komen Career Catalyst Research (CCR) Review Panel
Jan 2015	NIH Study Section ZRG1 OTC-N
Nov 2014	NIH Study Section ZRG1 OTC-N
Sept 2014	NIH Study Section CII
June 2014	NIH Study Section ZRG1 OTC-N
Aug 2012	CDMRP Prostate Cancer Research Program-STP
Aug 2011	CDMRP Prostate Cancer Research Program-TRN-PBY

12.2 JOURNAL MANUSCRIPT REVIEW

Cancer Immunology Research, Cancer Research, Journal of Visualized Experiments (JOVE), Expert Review of Vaccines, Expert Opinion on Drug Delivery, Journal of Applied Polymer Science, Clinical and Developmental Immunology, Soft Matter, Bioelectrochemistry, European Journal of Pharmaceutics and Biopharmaceutics, Nanomedicine, Annals of Biomedical Engineering, Marine Drugs

12.3 CONFERENCE ORGANIZATION

Organizing Chair, IEEE-NANOMED (2015)

12.4 CONFERENCE SESSION CHAIR

Biomaterials for Immunoengineering III, BMES Annual Meeting (2015)

12.5 CONFERENCE ABSTRACT REVIEW

Society for Biomaterials Annual Meeting (2015)
BMES Annual Meeting (2015)

12.6 DEPARTMENTAL COMMITTEES

2014-2015 Biomedical Engineering Faculty Search (Chair)

2013-2014	Biomedical Engineering Faculty Search (Chair)
2014-2015	Graduate Studies Committee, Biomedical Engineering (Chair)
2012-2105	Graduate Coordinator, Biomedical Engineering
2011-2012	Biomedical Engineering Faculty Search (Chair)
2010-2012	Safety Committee (Chair)
2010-2012	Academic Matters & Curriculum Committee
2010-2012	Body of Knowledge Committee
2010-2012	Strategic Plan Committee
2009-2012	Biomedical & Health Committee
2009-2012	Graduate Committee, Biological
2009-2012	Graduate Committee, Biomedical

12.7 COLLEGE COMMITTEES

2015-present	Biomedical Engineering Department Head Search Committee
2014-present	Engineering Research Council
2014	Associate Dean for Research Search Committee
2013-2014	Research Task Force
2012-2015	Technology Committee
2010-2012	Laboratory Safety Committee
2010-2011	Strategic Planning Committee

12.8 UNIVERSITY COMMITTEES

2014-present	Graduate School Faculty Advisory Board
2014-present	UA Core Facility Policy Committee
2012-2013	College of Engineering Dean Search Committee
2010-present	Institutional Animal Care and Use Committee