BIOGRAPHICAL SKETCH

NAME Duncan J. Maitland, Ph.D.	POSITION TITLE Associate Professor, Texas A&M University
eRA COMMONS USER NAME dmaitland	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Cleveland State University	B.E.E.	1985	Electrical Engineering
Cleveland State University	M.S.	1989	Physics
Northwestern University, Evanston, IL	Ph.D.	1995	Biomedical Engineering

A. Personal Statement

I am an Associate Professor in Biomedical Engineering at Texas A&M University with joint appointments in the Texas Institute for Preclinical Studies and the Materials Science and Engineering Program. Before joining Texas A&M in January 2008, I was employed at Lawrence Livermore National Laboratory (LLNL) for 12 years. I graduated from Northwestern University with a Ph.D. in Biomedical Engineering in 1995 under J.T. Walsh. My work at LLNL included a combination of programmatic (e.g. energy-materials interactions – via computational codes, weapons sensors - experimental) and biomedical applications (e.g. developing shape memory polymers). When I left LLNL, I was the Medical Technology Program Leader where I managed 20 Ph.D.s and over 20 staff. I retain a faculty appointment at LLNL. I was awarded a competitive renewal of a National Institutes of Health (NIH) Bioengineering Research Partnership (BRP) that has permitted me to build my research program (Biomedical Device Laboratory) at Texas A&M, develop new collaborations at Texas A&M, and maintain a research relationship with LLNL.

My goal as a biomedical engineer is to develop technology that has the potential to improve clinical healthcare within an environment of scientific openness. My single greatest achievement to date occurred on a Saturday afternoon in 1996 when I received a call that a shape memory polymer (SMP) device that I had conceived of, designed, and fabricated was successfully used to treat a patient's brain aneurysm. This is the first known SMP device used in humans. As a second example of making a difference in healthcare, the device designed in my first project as a post doc, photoacoustic thrombolysis, is currently in FDA trials with a large medical device company.

I have extensive experience in managing multidisciplinary projects including currently serving as the PI of a BRP for developing SMPs for treating stroke (in year eight of ten). The stroke SMP BRP includes Drs. Wilson, Miller and Clubb that are on this application. The SMP-PFO device design was my concept and the preliminary work toward that device was conducted in my laboratory.

B. Positions and Honors

Professional Positions

1985-1987 Systems Engineer, Loral Aerospace (Formerly Goodyear Aerospace), Akron, Ohio.
1987-1989 Fiber Optic Sensor Design Engineer, NASA Glenn (Lewis) Research Center, Cleveland, Ohio.
1989-1991 Graduate Research Assistant, quantifying optical properties of human tissues, Northwestern University, Evanston, Illinois.
1991-1995 Graduate Research Assistant, tissue optics, Northwestern University, Evanston, Illinois.

Lawrence Livermore National Laboratory (LLNL)

1995-1997 Postdoc in the X-Division Advanced Technology Group, LLNL
1997 Staff Physicist, Medical Technology Program, LLNL
1998-2002 Group Leader, Medical Technology Program, LLNL
2002-2004 Associate Division Leader, Medical Physics and Biophysics Division, LLNL
2004-2007 Program Leader, Medical Technology Program, LLNL
2008- Faculty Scientist, Medical Technology Program, LLNL

Texas A&M University

2008- Associate Professor, Biomedical Engineering Department, Texas A&M University
2008- Senior Scientist, Texas Institute for Preclinical Studies
2008- Faculty, Materials Science and Engineering Program

2009- Founder & Interim CEO, Shape Memory Therapeutics, Inc.

Honors

1993 American Society for Laser Medicine and Surgery - Travel Grant Recipient
1994 Gordon Research Conference, Lasers in Medicine and Biology - Graduate Student/Postdoctoral Competitive Award
1995 IEEE Engineering in Medicine and Biology/Whitaker Annual Student Competition - Open finalist.
1998 *R&D Magazine's* R&D 100 Award for the top 100 commercial products having technological significance for a Two-Color Fiberoptic Temperature Controller
1998 Federal Laboratory Consortium Award for excellence in technology transfer: "Optoacoustic revascularzation".
1999 Federal Laboratory Consortium Award for excellence in technology transfer: "Embolic Coil Delivery System for Preventing Hemorrhagic Strokes".
2002 Physics and Applied Technologies Directorate Award for Leadership in Biomedical Engineering
2005 Honorable Mention Poster Award, University of California System-Wide Bioengineering Symposium: Laser-Activated Shape Memory Polymer Thrombus Retrieval Device for Ischemic Stroke Treatment
2006 LLNL Physics and Applied Technologies Directorate Award
2007 Keynote Conference Presentation, Materials and Processes for Medical Devices, Palm Springs, California, "Medical Device Applications of Shape Memory Polymers," September 2007.
2008 Recipient of a Texas Emerging Technology Fund Superiority Award
2010 Biomedical Engineering Society, Texas A&M Chapter, Faculty of the Year
2010 William Keeler Faculty Fellow, Texas A&M Engineering

C. Selected Referred Publications (from 46 archival publications; denotes student - **undergrad, *grad)

1. Metzger**, M.F., D. Schumann, T.S. Wilson, D.L. Matthews, and **D.J. Maitland**, "Mechanical Properties of a Mechanical Actuator for Treating Ischemic Stroke," *Biomedical Microdevices* 4(2), pp. 89-96, May 2002.

2. **Maitland, D.J.**, M.F. Metzger**, D. Schumann, T.S. Wilson, A. Lee, and D.L. Matthews, "Photothermal Properties of Laser-Activated Shape Memory Polymer Microactuators for Treating Stroke," *Lasers in Surgery and Medicine* **30**, pp. 1-11, 2002.

3. Buckley*, P.R., G.H. McKinley, T.S. Wilson, W. Small IV, J.P. Bearinger, M.W. McElfresh, W. Benett, and **D.J. Maitland** "Inductively Heated Shape Memory Polymer for the Magnetic Actuation of Medical Devices," *IEEE Trans. Biomed. Eng* **53**(10)., September, pp. 2075- 2083, 2006.

4. Baer*, G., T.S. Wilson, D.L. Matthews, and **D.J. Maitland**, "Shape-memory behavior of thermally stimulated polyurethane for medical applications," *J Appl Pol Sci* **103**(6), pp.3882-3892, 2007.

5. Cabanlit*, M., **D.J. Maitland**, T. Wilson, S. Simon, T. Wun, M.E. Gerswin, and J.Van de Water, "Polyurethane Shape Memory Polymers Demonstrate Functional Biocompatibility In Vitro," *Macromo. Biosci.* **7,** pp. 48-55, 2007.

6. Baer*, G., T.S. Wilson, W.J. Benett, D.L. Matthews, and **D.J. Maitland**, "In vitro deployment of laser-activated shape memory polymer vascular stent," *Biomed. Eng. Online* **6**(43), 2007.

7. Wilson, T.S., J.P. Bearinger, J.L. Herberg, J.E. Marion** III, W. Wright, C.L. Evans, and **D.J. Maitland** " Shape memory polymers based on uniform aliphatic urethane networks," *J. Appl. Poly. Sci.* **106**, pp. 540–551, 2007.

8. **Maitland, D.J.**, W. Small IV, J.M. Ortega, P.R. Buckely*, J.Rodriguez**, J. Hartman and T.S. Wilson, "Prototype laser-activated shape memory polymer foam device for embolic treatment of aneurysms," *J. Biomed. Opt. Lett.* **12,** 030504, 2007.

9. Baer*, G., T.S. Wilson, J. Hartman, W. Small, W.J. Benett, D.L. Matthews, and **D.J. Maitland**, "Thermomechanical Properties, Collapse Pressure, and expansion of Shape Memory Polymer Neurovascular Stent Prototypes," *J. Biomed. Mat. Res.B: App. Biomat.***90B**(1), pp. 421-429, 2009.
10. Small, W., IV, P. Singhal*, W. Hwang*, T.S Wilson and **D.J. Maitland**, "Magnetic Resonance Flow Velocity and Temperature Mapping of a Shape Memory Polymer Foam Device," *BioMed. Eng. OnLine**8**:42 DOI:10.1186/1475-925X-8-42*, 2009.
11. (invited) Small, W., IV, T.S. Wilson, P. Singhal*, and **D.J. Maitland**, "Biomedical Applications of Thermally Actuated Shape Memory Polymers," *J. Materials Chem.* **20**, pp. 3356–3366*, DOI: 10.1039/B923717H,* 2010.
12. (invited) Volk*, B.L., D.C. Lagoudas, and **D.J. Maitland**, "Characterizing and Modeling the Free Recovery and Constrained Recovery of a Polyurethane Shape Memory Polymer," *Smart Materials and Structures* **20**, 2011.
13. Hwang*, W., B.L. Volk*, F. Akberali**, P. Singhal*, J.C. Criscione and **D.J. Maitland**, "Estimation of Aneurysm Wall Stresses Created by Treatment with a Shape Memory Polymer Foam Device," *Biomechanics and Modeling in Mechanobiology DOI: 10.1007/s10237-011-0345-8*, 2011.
14. Yu*, Y-J., K. Hearon*, T.S. Wilson, and **D.J. Maitland**, "The effect of moisture absorption on the physical properties of polyurethane shape memory polymer foams," *Smart Materials and Structures* **20**, July 2011.
15. Rodriguez*, J.N., Y.J. Yu*, M.W. Miller, T.S. Wilson, F.J. Clubb, J. Hartman, B. Gentry**, and **D.J. Maitland**, "Opacification of Shape Memory Polymer Foam Designed for Treatment of Intracranial Aneurysms," *in press Ann. Biomed. Eng.*, November 2011.

Issued Patents (from 12 total)

1. US Patent 6,102,917, Shape Memory Polymer Gripper Release System with Sensing of Target Release, **D.J. Maitland**, A.P. Lee, D.L. Schumann, and L. Da Silva, filed July 15, 1998.
2. US Patent 6,740,094, Shape Memory Polymer Actuator and Catheter, **D.J. Maitland**, A. Lee, D.J. Schumann, D. Matthews, D. Decker, C. Jungreis, filed Jan. 16, 2001, issued May 25, 2004.
3. US Patent 7,291,154 (divisional of 6,740,094), Shape Memory Polymer Actuator and Catheter, **D.J. Maitland**, A. Lee, D. Schumann, D. Matthews, D. Decker, C. Jungreis, filed Jan. 16, 2001, issued November 6, 2007.
4. US Patent 7,386,203, System for Diffusing Light from and Optical Fiber or Light Guide, **D.J. Maitland**, W. Small, T.S. Wilson and W. Benett, filed June 18, 2006, issued June 10, 2008.
5. US Patent 7,591,834, Buckley, P.R. and **D.J. Maitland**, "Shape Memory System with Integrated Actuation Using Embedded Particles," filed September 29, 2005, issued September 22, 2009.
6. US Patent 7,611,524, **D.J. Maitland**, W. Small, and J. Hartman, "Guide Wire Extension for Shape Memory Polymer Occlusion Removal Devices," filed September 27, 2005, issued November 3, 2009.

D. Selected Research Support

Ongoing Research Support

R01 EB000462-10 Maitland (PI) 05/01/02-04/30/12
Shape Memory Polymer Devices for Treating Stroke
Summary: This is a multidisciplinary, multi-institutional project that will develop acute (endovascular clot extraction devices) and chronic therapies (stents and embolic devices) for treating/preventing ischemic and hemorrhagic strokes.
Role: PI

Completed Research Support

Texas ETF Maitland (PI) 08/01/09-12/31/11
Commercialization of Shape Memory Polymers
Summary: State of Texas translational funding to support the commercialization of shape memory polymer foams for treating cerebrovascular aneurysms.

Role: PI

09-31 Maitland (PI) 09/01/09
Permanent University Fund Support of a Combined Particle Image Velocimetry and Laser Induced Fluorescense Microscope
Summary: Dwight Look College of Engineering and Department of Biomedical Engineering support for capital equipment purchase of a flow/temperature microscope.
Role: PI

Texas ETF Superiority Award Fossum (PI) 01/22/08
Texas Emerging Technology Fund award to the Texas Institute for Preclinical Studies (TIPS)
Summary: State of Texas capital equipment support for TIPS. Funding allocated to DJM used to purchase 3T Philips MRI.
Role: Co-I

NSF S&T Center Hartman (PI) 08/01/06-07/31/08
In vivo demonstration of aneurysm treatment using laser-deployed shape memory polymer foams
Summary: NSF Science & Technology Center For Biophotonics support of a pilot animal study of laser-activated shape memory polymer foams for treating necked aneurysms.
Role: Co-I

LDRD-04-ERD-093 Maitland (PI) 04/01/04-03/31/07
Dynamics of Interventional Vascular Devices
Summary: A LLNL Laboratory Directed Research and Development (LDRD) Award (peer-reviewed competitive award). Multidisciplinary project aimed at exploring device-body interactions. This project combined simulations (flow, radiation transport, molecular transport, mechanical dynamics) with high-resolution flow MRI and particle image velocimetry to study the impact of the SMP devices during and after deployment.
Role: PI

DOE-OBER-LAB99-18 Maitland (PI) 07/01/99-09/30/01
Shape Memory Polymer Microactuator for Treating Ischemic Stroke"
Summary: This was the initial peer-reviewed support of SMPs from the Office of Biological and Environmental Research, Department of Energy. Initial prototypes of the ischemic stroke treatment device were developed and tested.
Role: PI

R43 NS044816-1 Metzger (PI) 07/01/03-06/31/04
Interventional Applications of Shape Memory Polymer Foam
Summary: This project was the initial support that developed novel SMP foams. The primary application of to be pursued with this grant is SMP foam actuator structure/property applied to an aneurysm/AVM occlusion device.
Role: Co-I

R43 EB003702-1 Metzger (PI) 09/01/04-08/31/05
Polymer Actuator for Peripheral Vessel Thrombectomy
Summary: This project applied the SMP foams to actuators designed for removing blockages in the peripheral vasculature.
Role: Co-I

R01 CA085991-4 Maitland (PI) 08/01/00-07/31/04
Polarized Light Imaging Propagation and Imaging in Tissue
Summary: This project developed expertise and tools pertinent to polarized light propagation in turbid media. Emphasis was placed on exploring the fundamental physics, developing new theoretical models, and obtaining proof-of-concept data.
Role: PI