

Florida Atlantic University
 Division of Research
 Annual Review of Centers/Institutes
 Fiscal Year 2005-2006

Center/Institute Name	Type	Director	E-mail	Extension
Center for Biological and Materials Physics	III	Theodora Leventouri	leventou@fau.edu	2695

Center/Institute Address(s)
Department of Physics Florida Atlantic University 777 Glades Road Boca Raton, FL 33431

Please provide the following information by March 16, 2007:

1. Date of Formation of the Center/Institute ___ founded in 1989 as the Alloy Research Center.
2. Website Address of the Center/Institute __ <http://physics.fau.edu/~cbamp/>
3. Website Last Updated __2006
4. State the mission of the Center/Institute and relate it to the FAU Mission (see, for example, <http://www.fau.edu/strategicplan/>).

The Center for Biological and Materials Physics provides a focus for communications and forging collaborations to facilitate studies in Biological Physics and Materials Physics. These disciplines are closely related, and their scopes are defined by the American Physics Society. Biological Physics deals with the study of biological phenomena using Physical techniques. Materials Physics applies fundamental Condensed Matter Physics concepts to complex and multiphase media, including materials of technological and biological interest. The research includes the development of new experimental techniques and new theoretical approaches. External funding for this research is actively sought.

5. Provide a description of the Center/Institute internal structure and/or organization chart (home college/department/division, center faculty, associated faculty, staff, titles phone number, and location). Indicate personnel directly funded by the center/institute

The Center is contained within the Department of Physics, Charles E. Schmidt College of Science. The Director is Dr. Theodora Leventouri, and the Associate Director is Dr. J. S. Faulkner.

Faculty associated with the Center are:

Dr. J. S. Faulkner
Prof. of Physics (emeritus) 7-3429 faulkner@fau.edu
Dr. A. Lau
Asst. Prof. of Physics 7-4254 alau@physics.fau.edu
Dr. Th. Leventouri
Assoc. Prof. of Physics 7-2695 leventou@fau.edu
Dr. N. Moghadam
Visiting Asst. Prof. of Physics 7-3386 moghadam@fau.edu
Dr. S. L. Qiu
Prof. of Physics 7-2791 qiu@physics.fau.edu
Dr. K. D. Sorge
Asst. Prof. of Physics

6. List all other centers/institutes, and programs within FAU that are associated with the center/institute

Nanocomposites Research in Ocean Engineering

Biophysics and Bioanalytical Research in the Department of Chemistry and Biochemistry

High Performance Computing in the College of Computer Science and Engineering.

7. List all other institutions of higher education associated with the Center/Institute

Oak Ridge National Laboratory

University of Pennsylvania

National Technical University of Athens, Greece

Ecole Supérieure Physique Chimie Industrielles Ville Paris (ESPCI) Paris, France.

8. Provide an executive summary of the Center's/Institute's activities, services, and achievements in the past fiscal year. Include supporting documentation.

Members of the center published 16 refereed papers, 1 book chapter, and 9 presentations at major national and international meetings.

Publications 2006

1. Synthetic and Biological Hydroxyapatites: Crystal Structure Questions ", Th. Leventouri, J. Biomat. 27, 3339-3342, (2006). (Leading Opinion Paper, invited).

2. "Magnetic Alloys in Nanoscale Biomaterials", Th. Leventouri, A. V. Melechko, K. D. Sorge, K. L. Klein, J. D. Fowlkes, P. D. Rack, I. M. Anderson, J. R. Thompson, T. E. McKnight, M. L. Simpson, *Trans Met A*, 37A, 3423-3427,(2006).
3. "Mean field approximations for the electronic states in disordered alloys" J. S. Faulkner, S. Pella, A. Rusanu, Y. Puzyrev, Th. Leventouri, G. M. Stocks, and B. Ujfalussy, *Phil. Mag.* 86 2661-2671, (2006).
4. "Micro-Raman and FTIR Studies of Synthetic and Natural Apatites", A. Antonakos, E. Liarokapis, Th. Leventouri. *J. Biomat.*, jbmt6293, submitted.
5. "Low temperature properties of fcc Al from modified Debye theory" S.L. Qiu, F. Apostol and P.M. Marcus, , *J. Phys.: Condens. Matter*, accepted.
6. "Atomic displacements in alloys" Yevgeniy Puzyrev and J. S. Faulkner, *Trans Met A*, 37A (2006) in press.
7. "Annealingenvironment effects on the properties of CoPt nanoparticles formed in single-crystal Al₂O₃ by ion implantation," C. W. White, S. P. Withrow, J. D. Budai, D. K. Thomas, J. M. Williams, A. Meldrum, K. D. Sorge, J. R. Thompson, G. W. Ownby, J. F. Wendelken, and L. A. Boatner, *J. Appl. Phys.* 98, 114311 (2005).
8. "Geometry and magnetism of L10 nanostructures," K. D. Sorge, R. Skomski, M. Daniil, S. Michalski, L. Gao, J. Zhou, M. Yan, Y. Sui, R. D. Kirby, S. H. Liou, and D. J. Sellmyer, *Scripta Materialia* 53, 457 (2005).
9. "Magnetization reversal in particulate L10 nanostructures," J. Zhou, R. Skomski, K. D. Sorge, and D. J. Sellmyer, *Scripta Materialia* 53, 453 (2005).
10. "Vortex pinning and slow creep in high-Jc MgB₂ thin films: a magnetic and transport study," J. R. Thompson, K. D. Sorge, C. Cantoni, H. R. Kerchner, D. K. Christen, and M. Paranthaman, *Supercond. Sci. Technol.* 18, 970 (2005).
11. "Nanomagnetic Structures: Fabrication and Interactions," D. J. Sellmyer, Y. C. Sui, Y. F. Xu, M. L. Yan, K. D. Sorge, and R. Skomski, *Mater. Res. Soc. Symp. Proc.* 853E, I6.1.1 (2005).
12. "Highly coercive thin-film nanostructures," J. Zhou, R. Skomski, A. Kashyap, K. D. Sorge, Y. Sui, M. Daniil, L. Gao, M.-L. Yan, S.-H.Liou, R. D. Kirby, and D. J. Sellmyer, *J. Magn. Mater.* 290–291, 227 (2005).
13. "Dynamics of bacterial flow: Emergence of spatiotemporal coherent structures", N. Sambelashvili, A.W.C. Lau, D. Cai, *Phys. Lett. A*, 360 507 (2007).
14. "Fluctuations and Rheology in Active bacterial Suspensions", D.T.N. Chen, A.W.C. Lau, L.A. Hough, M.F. Islam, M. Goulian, T.C. Lubensky, and A.G. Yodh, Submitted to PRL.
15. "State-dependent diffusion: thermodynamic consistency and its path integral formulation," A.W.C. Lau and T.C. Lubensky, Submitted to PRE
16. "Fluctuation effects in a highly charged surface immersed in an added salt solution," W. Kung and A.W.C. Lau, Submitted to PRE.

Book Chapter

"Structure Studies of Hydroxyapatite-based Biomaterials", Th. Leventouri, invited by Nova Science Publishers Inc. in Press.

Book title: Trends in Biomaterials Research. Editor: Patrick J. Pannone ISBN-1-978-1-60021-361-8.

Presentations

1. "Exploring the Magnetic Properties of Fe-Co Catalyst Particles for Nano-Heating" Th. Leventouri, K.D. Sorge A.V. Melechko, K.L. Klein, J.D. Fowlkes, P.D. Rack, I.M. Anderson, E. Kenik, J.R. Thompson, M.L. Simpson, CNMS Annual Meeting, ORNL, June 14-16, 2006.
 2. "FTIR and Low Temperatures Micro-Raman study on Carbonate Apatites as a function of carbonate content" A. Antonakos, E. Liarokapis, Th. Leventouri. 5th International Conference on Inorganic Materials, Ljubljana, Slovenia, 23-26 September, 2006.
 3. "Micro-Raman and FTIR Studies on Carbonate Apatites" A. Antonakos, E. Liarokapis, Th. Leventouri. ESB, 20th European Conference on Biomaterials, September 27th–October 1st, Nantes France, 2006.
 4. "Fe-Co magnetic alloy catalysts for the synthesis of vertically aligned carbon nanofibers" K.L. Klein, A.V. Melechko, J.D. Fowlkes, I.M. Anderson, K. D. Sorge, T. Leventouri, J.R. Thompson, R. Rucker, P.D. Rack, T. E. McKnight, and M.L. Simpson, MRS Spring Meeting, San Francisco, CA, April 17-21, 2006.
 5. Andy W. C. Lau, Physics Colloquium at Florida Atlantic University, September 2006.
 6. Andy W. C. Lau, Seminar at ESPCI, Paris, France, September 2006.
 7. Andy W. C. Lau, Seminar at University of Paris VI, October 2006.
 8. Andy W. C. Lau, Seminar at Vrije Universiteit, October 2006.
 9. "Magnetic Properties of Fe-alloy Catalyst Nanoparticles for Carbon Nanofiber Synthesis" K. D. Sorge, Th. Leventouri, C. Finkel, O. Malkina, P. D. Rack, A. V. Melechko, J. D. Fowlkes, K. L. Klein, M. L. Simpson, MAR06 APS Meeting, Baltimore MD March 13-17, 2006.
 10. "Biomaterials Research at the Nanoscale," Frontiers in Science, CES College of Science, FAU, March 2, 2006.
 11. "Magnetic Properties of Fe-alloy Catalyst Nanoparticles for Carbon Nanofiber Synthesis" K. D. Sorge, Th. Leventouri, C. Finkel, O. Malkina, P. D. Rack, A. V. Melechko, J. D. Fowlkes, K. L. Klein, and M. L. Simpson, March Meeting APS, Baltimore, MD, March 13–17, 2006.
 12. "Evolution of Fe-Co Magnetic Alloys: from Thin Films to Catalyst Nanoparticles for Carbon Nanofiber Synthesis," K. L. Klein, A. V. Melechko, J. D. Fowlkes, K. D. Sorge, T. Leventouri, R. Rucker, P. D. Rack, and M. L. Simpson,, MRS Fall 06 Meeting
 13. "Exploring the Properties of Fe-Co Catalyst Particles for Nano-Heating," Th. Leventouri, K. D. Sorge, A. V. Melechko, K. L. Klein, J. D. Fowlkes, P. D. Rack, I. M. Anderson, J. R. Thompson, E. Kenik, and M. L. Simpson, CNMS Users Meeting, Oak Ridge, TN.
9. Describe the Center's/Institute's contributions to the University and to the local, national, and international academic communities as appropriate.

Members of CBAMP are playing their role as Teachers and Researchers. We have 5 graduate students. New graduate courses are developed while the members teach a full load of graduate and undergraduate courses.

The research activities are shown by the published papers in this report. Members of the Center collaborate with National Labs, other Universities,

13. What are the Center/Institute goals for the up-coming year?

CBAMP will continue to pursue its vision to become a world-class center for experimental and theoretical research in biological and materials physics by:

1. integrating the efforts of the present members.
2. attracting new faculty to FAU.
3. expanding collaborations/interactions within FAU, national, and international.

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