

Existing Collaborations at UMass at the Materials-Immunology Interface

Collaborative Grants (active or recently finished):

“Building an Apoptosis-Reporting Mouse,” Hardy, J. and Tremblay, K., PVLSI Center of Excellence in Apoptosis Research, \$60/year, 2009-2010.

“Material-Directed Apoptosis of Breast Cancer Cells,” PVLSI Center for Excellence in Apoptosis Research, Santore, M. and Arcaro, K., \$30,210, 2008–2009.

“Surfaces That Selectively Manipulate and Kill Bacteria,” Santore, M. (PI) and Tew, G. (Co-PI), National Science Foundation, \$470,000, 2008–2011.

“Antimicrobial Oligomers for BioDefense and Emerging Foodborne Infectious Diseases,” Tew, G., Anguita, J., Osborne B., NIH, \$6,612,620, 2009-2015.

“Antimicrobial Oligomers and the Innate Immune System,” Tew, G. and Anguita, J., Melinda and Bill Gates Foundation, \$100,000, 2009-2010.

“High-Throughput Screening of Molecules that Bind to Specific Toll-like Receptors,” Mountziaris, T.J. and Latz, E. (UMass Worcester, Immunology), UMass President's Science and Technology Funds (UMass Nanomedicine Institute).

Unfunded Pilot Efforts (targeting upcoming proposals):

Tew, G. and Telfer, J., “Cell penetrating peptide mimics.”

Santore, M., Osborne, B. and Minter, L., “Surfaces that Selectively Reprogram Autoaggressive T-cells.” Recommended for funding by NSF EFRI program in 2009, but not actually funded.

Heuck, A., Black, S. and Minter, L. “Optimizing Immune Responses Using Immunoregulatory Drones.”

Santore, M. and Ross, J. “Imaging Synthetic Adhesion Molecules Immobilized on Surfaces.”

Bermudez, H. and Earle, D., Loading Hernia Meshes, Antimicrobials and Immuno-Suppressants via Layer-by-Layer Methods.”

Bermudez, H. and Aranda-Espinoza, H. (UMD, Bioengineering), “Modulating Immune Cell Recognition with Peptide Motifs,” pending, NIH R21.

Bermudez, H. and Jerry, J. “Dynamic Polymer Surfaces to Identify Metastatic Potential,” pending, NIH R21 (resubmission).

Hayward, R. and Kurt-Jones, E. (UMass Worcester), “Evaluating the Influence of Nano- and Micro-Scale Surface Texturing of Particles on Immune Response”.

Dinsmore, A. and Weis, R., “Membrane Proteins in the BAR Superfamily.”

Bermudez, H. and Mountziaris, T.J., “Hybrid Nanoparticle-DNA Structures for Gene Delivery Applications.”

Collaborative Publications:

Kalasin, S., Arcaro, K. and Santore, M. M., “Designing Surfaces Which Adhesively Discriminate Cells Without the Use of Biomolecular Fragments,” in preparation for *Biomaterials*.

Gon, S., Ross, J. and Santore, M.M.*, “Manipulating Protein Adsorption using a Patchy Protein-Resistant Brush,” in preparation for *Langmuir*.

Intellectual Property:

Kalasin, S., Arcaro, K. and Santore, M. M., “Surfaces Which Adhesively Discriminate Cells Without the Use of Biomolecular Fragments,” Disclosed to UMass CVIP 2/2010.

Mountziaris, T.J. and Wang, J., Platform Technology for Instantaneous Detection of Biological Interactions (including the structure of the resulting probe-target complex) Using Functionalized Nanoparticle-Based Probes,” Disclosed to UMass CVIP 12/2009, Provisional patent filing 2/2010.

Teaching Collaborations:

Immunology lab (Microbio 542). This laboratory course is designed to introduce students to important immunology principles, while becoming familiar with and proficient in the performance of modern clinical and research protocols in cellular and molecular immunology, protein biochemistry, immunochemistry and clinical serology at the advanced undergraduate level. The current collaborative version of this course has been in place since 2004 and has included W. Webley, S. Black, L. Minter, B. Osborne and C. Baldwin from Veterinary and Animal Sciences. Pertinent to future educational activities, this class works with the mouse lymphatic system, flow cytometry, lymphocyte population studies, hemagglutination and complement fixation tests (sheep blood).

Molecular Medicine (ANSCI 672) An introduction to diseases of major organ systems and biotechnological approaches to improve diagnosis and treatment. Topics include cancer, genetic disease, cardiac disease, neurologic disorders, and tissue transplantation. The current version of this course has been in place for 3 years and included lectures from J. Hardy, J. Jerry, and S. Smith-Schneider.

X-ray: A Practical Minicourse: (BIOC 697N) This course is a laboratory module in which students learn both theoretical and practical aspects of protein structure determination by x-ray crystallography. This course has been taught in its current form for 4 years (sometimes multiple times in a year) with instructors J. Hardy, S. Garman, and K. Theis. This course is now offered as a module within the nearly-completed ICE IGERT, and can transfer to the proposed IGERT because of its focus on molecules important to the immune system, such as CD4.

Biopolymers (POLYMER 742) This interdisciplinary course covers: (i) structure of biopolymers, (ii) natural, recombinant, and chemical synthesis of biopolymers, (iii) methods of their analysis, and (iv) their physio-chemical properties. Synthetic analogues of biopolymers are also be discussed. This new course is team-taught by H. Bermudez and G. Tew and will be an IGERT elective.

Fundamentals of Cellular Engineering. (CE-690F) This course aims to give students a broad perspective on cellular biology, and the manipulation of cells using materials and targeted synthetic compounds. This new course, part of the ICE IGERT, has been team-taught for the past 2 years by S. Robertson., S. Schneider, H. Bermudez, M. Santore, D. Schnell, J. Ross, J. Hardy, and others.

Topics on Fluorescence Spectroscopy: Fluorescence Lifetime Determinations (Chem Eng 796) Fluorescence lifetime is one of the most important characteristics of a fluorescent probe because it defines the time window of observation of dynamic phenomena (FRET, quenching, anisotropy). This course introduces the principles for pulse fluorometry and phase modulation fluorometry, teaching students to determine the lifetime of fluorophores in biological samples. This course was offered as part of the ICE IGERT menu of lab modules. Instructor: A.P. Heuck