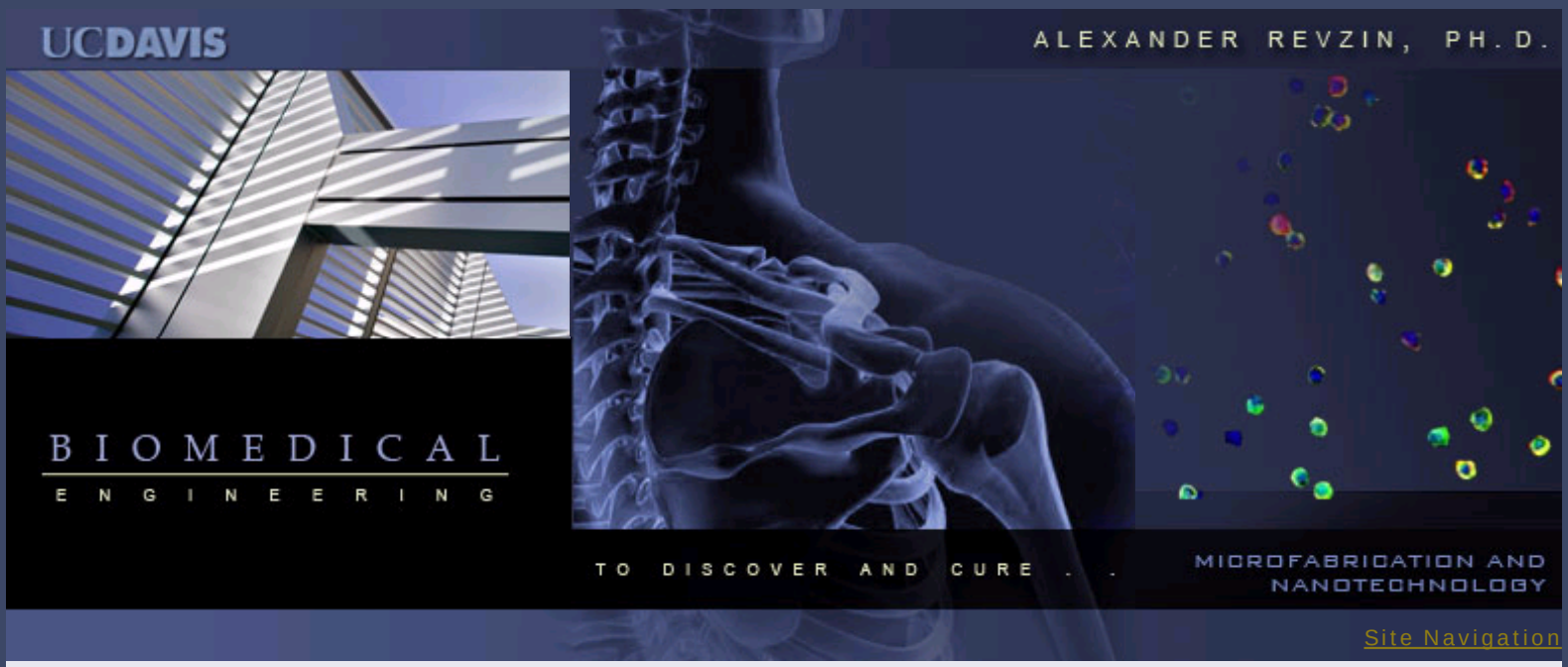

Site Navigation

ALEXANDER REVZIN, PH.D.

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PERSONAL EDUCATION

Ph.D. Chemical Engineering 2002 Texas A&M University
Postdoctoral Fellowship Harvard Medical School 2004

AFFILIATION

Biomedical Engineering Graduate Group

RESEARCH INTEREST

Traditional cell biology techniques monitor large cellular populations and report dominant trends while leaving contributions from smaller cell subsets unaccounted for. In contrast, my research focuses on observation and quantitative interrogation of small cell populations or single cells. Aspects of microfabrication, biomaterial design, surface science, cell biology and biosensing are employed to achieve research objectives. Specific biological systems of interest are white blood cells (leukocytes) and liver cells (hepatocytes).

Microfabricated Cytometry Platform for Characterization and Sorting of Leukocytes

Current techniques for handling of white blood cells (leukocytes) are not amenable to characterization of small cell populations or individual rare blood cells. This is a major shortcoming given that detection of rare leukocytes in peripheral blood has tremendous importance for early diagnosis of malignancies, infections and prenatal/neonatal complications. To address this problem, we are developing a microfabricated cytometry platform for characterization and sorting of leukocytes. In this project, surface engineering and microfabrication are used to organize leukocytes into high-density arrays by capturing them onto microdomains decorated with cell-specific antibodies. Cells in the array are characterized based on morphology and/or antigen expression profiles to identify leukocyte subset of interest.

Combinatorial Design of Cellular Microenvironment for Hepatic Tissue Engineering

Standard cell biology methods for evaluating the effects of biological stimuli (e.g. cell-cell, cell-surface, cell-solution interactions) on cell function vary these stimuli one-at-a-time and employ large numbers of cells. The overall goal of this project is to optimize function of liver cells (primary hepatocytes) by exposing small groups of these cells to multiple microenvironmental stimuli in parallel. Novel microfabrication and surface engineering strategies are being developed to orchestrate cell-cell and cell-surface interactions in a combinatorial fashion. Microfluidic devices will be employed to expose hepatocytes to well-defined concentration profiles of soluble growth factors.

PUBLICATIONS

Revzin A., Rajagopalan P., Tilles A.W., Berthiaume F., Yarmush M.L., Toner M. "Designing a Hepatocellular Microenvironment with Protein Microarraying and Poly(ethylene glycol) Photolithography" Langmuir 2004, 20, 2999-3005.

Revzin A., Tompkins R.G., Toner M. "Surface Engineering with Poly(ethylene glycol) Photolithography to Create High-Density Cell Arrays on Glass" Langmuir, 2003, 19, 9855-9862.

Revzin A.F., Sirkar K., Pishko M. V. "Glucose, Lactate and Pyruvate Biosensor Arrays Based on Redox Polymer/Oxidoreductase Nanocomposite Thin Films Deposited on Photolithographically Patterned Gold Electrodes" Sensors & Actuators B, 2002, 81, 359-368.

Revzin A., Russell R.J., Hile D.D., Koh W., Mellott M.B., Pishko M.V. "Fabrication of Poly (ethylene glycol) Hydrogel Microstructures Using Photolithography" (cover of the issue) Langmuir, 2001, 17, 5440-5447.

MAJOR RESEARCH INTERESTS

Microfabrication and nanotechnology for manipulation and analysis of cellular systems; single cell manipulation; biosensors for monitoring activity of individual cells; combinatorial screening of cell-microenvironment interactions; BioMEMS; biomaterials; surface science.