

Profile

Experimental researcher interested in developing and modeling nano- and micro- systems, together with machine-learning methods, for rapid screening, biological and chemical analysis, medical imaging, diagnosis, and therapy.

Current Projects

Highly multiplexed biomarker detection with SERRS nanoparticles; Machine learning techniques for classification of Raman spectral images; Nanoparticles as contrast agents for optoacoustic biomedical imaging.

Education

- Ph.D. in Biochemistry and Molecular Biology**, emphasis in Bioengineering 2008–2013
University of California, Santa Barbara
“Interfacial transport processes in microfluidic systems for precision surface enhanced Raman spectroscopy”.
- M.Sc. in Electrical Engineering**, University of Cyprus 2006–2008
“Design and fabrication of dielectrophoresis-based devices for cell manipulation and separation”.
- B.Sc. in Mathematics**, Pennsylvania State University 2002–2006
B.Sc. in Physics (with Honors), emphasis in Electronics
Honors Thesis: “Tunnelling and phase-sensitive studies of odd-parity superconductor Sr_2RuO_4 ”.

Research Experience

- Research Scholar**, Memorial Sloan Kettering Cancer Center, Radiology 2014–Present
Advisor: Moritz Kircher
- Synthesized nanoparticle probes for Raman and optoacoustic *in vivo* molecular imaging.
 - Imaged microscopic tumors in animal models of cancer.
 - Developed machine learning algorithms for optical spectroscopic medical imaging.
 - Designed and implemented graphical user interfaces for medical spectral data analysis.
- Postdoctoral Researcher**, UCSB, Institute for Collaborative Biotechnologies 2013–2014
Advisor: Carl Meinhart
- Designed and fabricated microfluidic systems for health monitoring applications.
 - Engineered multiphase microfluidic systems for precise nanoparticle control.
 - Mentored and trained undergraduate and graduate students.
 - Organized academic outreach programs for undergraduates.
- Graduate Student Researcher**, UCSB, Biomolecular Science and Engineering 2008–2013
Advisor: Carl Meinhart
- Designed and fabricated microfluidic devices for biofluid analysis and drug detection.
 - Employed machine learning techniques to analyze complex spectroscopic data.
 - Developed hardware and software for microfluidic flow control.
- Graduate Student Researcher**, University of Cyprus, Electrical Engineering 2006–2008
Advisor: George E. Georghiou
- Helped configure and setup a new experimental lab.
 - Designed and used electrokinetic microfluidic devices for microparticle manipulation.
 - Captured and enriched specific cell populations using the electrokinetic microdevices.
- Undergraduate Researcher**, Pennsylvania State University, Low Temperature Physics 2003–2006
Advisor: Ying Liu
- Fabricated and characterized superconducting devices (SQUIDs and Josephson junctions).
 - Investigated super-lattice structure geometries of odd-parity superconducting crystals.

Publications

Original Research

- [1] C. Kaittanis, **C. Andreou**, H. Hieronymus, C. A. Foss, M. Eiber, G. Weirich, P. Panchal, A. Gopalan, N. Mao, J. Zurita, S. Achilefu, G. Chiosis, V. Ponomarev, M. Schwaiger, B. S. Carver, M. G. Pomper, and J. Grimm: Folate hydrolase 1 Cleavage of Vitamin B9 Stimulates Oncogenic Signaling through Metabotropic Glutamate Receptors, **Journal of Experimental Medicine**, just accepted.
- [2] S. Banala, S. Fokong, C. Brand, **C. Andreou**, B. Krautler, M. Rueping, and F. Kiessling: Quinone-Fused Porphyrins as Contrast Agents for Photoacoustic Imaging, **Chemical Science**, 2017. [Get article](#)
- [3] T. R. Nayak*, **C. Andreou***, A. Oseledchyk, W. D. Marcus, H. C. Wong, J. Massagué, and M. F. Kircher: Tissue Factor-Specific Ultra-bright SERRS Nanostars for Raman Detection of Pulmonary Micrometastases, **Nanoscale**, 2017. *equal first co-author [Get article](#)
- [4] A. Oseledchyk, **C. Andreou**, M. A. Wall, and M. F. Kircher: Folate-targeted SERRS Nanoprobe Ratiometry for Detection of Microscopic Ovarian Cancer, **ACS Nano**, 2016. [Get article](#)
- [5] M. Spaliviero, S. Harmsen, R. Huang, M. A. Wall, **C. Andreou**, J. A. Eastham, K. A. Touijer, P. T. Scardino, and M. F. Kircher: Detection of Lymph Node Metastases with SERRS Nanoparticles, **Molecular Imaging and Biology**, 2016. [Get article](#)
- [6] **C. Andreou**, V. Neuschmelting, D.-F. Tschaharganeh, C.-H. Huang, A. Oseledchyk, P. Iacono, H. Karabeber, R. R. Colen, L. Mannelli, S. W. Lowe, and M. F. Kircher: Imaging of Liver Tumors Using Surface-Enhanced Raman Scattering Nanoparticles, **ACS Nano**, 2016. [Get article](#)
- [7] **C. Andreou**, R. Mirsafavi, M. Moskovits, and C. D. Meinhart: Detection of Low Concentrations of Ampicillin in Milk, **Analyst**, 2015. [Get article](#)
- [8] B. Piorek, **C. Andreou**, M. Moskovits, and C. D. Meinhart: Discrete Free- Surface Millifluidics for Rapid Capture and Analysis of Airborne Molecules Using Surface Enhanced Raman Spectroscopy, **Analytical Chemistry**, 2014. [Get article](#)
- [9] M. R. Barmi, **C. Andreou**, M. R. Hoonejani, M. Moskovits, and C. D. Meinhart: Aggregation Kinetics of SERS-Active Nanoparticles in Thermally Stirred Sessile Droplets, **Langmuir**, 2013. [Get article](#)
- [10] **C. Andreou**, M. R. Hoonejani, M. R. Barmi, M. Moskovits, and C. D. Meinhart, Rapid Detection of Drugs of Abuse in Saliva Using Surface Enhanced Raman Spectroscopy and Microfluidics, **ACS Nano**, 2013. [Get article](#)

Review Articles

- [11] **C. Andreou**, S. Pal, L. Rotter, J. Yang, and M. F. Kircher: Molecular Imaging in Nanotechnology and Theranostics, **Molecular Imaging and Biology**, 2017. [Get article](#)
- [12] **C. Andreou**, S. A. Kishore, and M. F. Kircher: Surface-Enhanced Raman Spectroscopy: A New Modality for Cancer Imaging, **Journal of Nuclear Medicine**, 2015. [Get article](#)

In Preparation or under Review

S. Roberts*, **C. Andreou***, C. Choi, P. Donabedian, M. Jayaraman, M. F. Kircher, T. Reiner, Optoacoustic Nanoemulsions as High Performance Tumor Imaging Agents, **in preparation**. *equal first co-author



Presentations

Invited Talks

University of Cyprus, Electrical Engineering seminar series, Surface Enhanced Raman Spectroscopy for Chemical Sensing and Biomedical Imaging: Microsystems and Microtumors, 29-Jun-2017.

University of Cyprus, Electrical Engineering seminar series, Multiphase Microfluidics and Surface Enhanced Raman Spectroscopy for Chemical Detection, 19-Jun-2013.

UCSB, Systems Biology seminar series, Multiphase Microfluidics and Surface Enhanced Raman Spectroscopy for Chemical Detection, 07-Jun-2013.

Selected Conference Presentations

A. Oseledchyk, **C. Andreou**, M. Wall, and M. F. Kircher: Ovarian Cancer Imaging using Folate-targeted SERRS nanoprobes Ratiometry, World Molecular Imaging Congress, New York, New York, USA, Sep. 07-10, 2016.

C. Andreou, V. Neuschmelting, D.-F. Tschaharganeh, C.-H. Huang, A. Oseledchyk, P. Iacono, H. Karabeber, S. W. Lowe, and M. F. Kircher: Imaging of Liver Tumors with Surface-Enhanced Raman Scattering Nanoparticles, World Molecular Imaging Congress, New York, New York, USA, Sep. 07-10, 2016.

C. Andreou, M. Moskovits, C. Meinhart, Picoliter Droplets of Controlled Composition for SERS Studies, 67th Annual Meeting of the APS Division of Fluid Dynamics, San Francisco, California, USA, Nov. 23-25, 2014.

C. Andreou, M. Moskovits, C. Meinhart, Assembly of Ag-Nanoparticle Clusters for Surface Enhanced Raman Spectroscopy in Droplets, The 18th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS 2014), San Antonio, Texas, USA, October 26-30, 2014.

C. Andreou, M.R. Hoonejani, M.R. Barmi, B. Piorek, M. Moskovits, and C. D. Meinhart, Microfluidic Device for Detection of Chemicals in Aqueous Mixtures using Surface Enhanced Raman Spectroscopy, The 15th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS 2011), Seattle, Washington, USA, October 2-6, 2011.

C. Andreou, S.J. Lee, B. Piorek, M. Moskovits, C. D. Meinhart, Multiphase microfluidics and Surface Enhanced Raman Spectroscopy, 63rd Annual Meeting of the APS Division of Fluid Dynamics, Long Beach, California, USA, Nov. 21-23, 2010.

C. Andreou, S.J. Lee, B. Piorek, M. Moskovits, C. Meinhart, Mapping concentration dependencies of SERS in a microfluidic device, Gordon Research Conference, Microfluidics (Physics and Chemistry of), Lucca, Italy, June 28- July 3, 2009.

C. Andreou, E. Demosthenous, C. Odiatis, N. Loucaides, P. Georgiades, A. Ramos, G. Georghiou, Dielectrophoretic capture and separation of Trophoblast Stem Cells and their differentiated progeny, 34th Micro- and Nano-Engineering Conference, Athens, Greece, 15-19 September 2008.

Honors and Awards

Best fifth-year graduate student seminar in Biological Sciences, UCSB	2013
Best third-year graduate student seminar in Biological Sciences, UCSB	2011
Dean's Fellowship, UC Santa Barbara Graduate Division	2008-2009
'Standard Bearer' of Penn State Physics graduating class	2006
Penn State Schreyer Honors College Scholar	2004-2006
Penn State Eberly College of Science Dean's list for 8/8 semesters	2002-2006
Full scholarship from the AMIDEAST Cyprus-America Scholarship Program (CASP)	2002-2006
National Scholarship from Cyprus to attend the United World College of the Adriatic	1998-2000



Teaching and Mentoring

Teaching

Primary instructor: UCSB, "Blender 3D: rendering graphics for scientific illustrations" (6 students)	Winter 2014
Replacement lecturer: UCSB, "Physical Chemistry" (30 students, 4 lectures)	Spring 2014
Replacement lecturer: UCSB, "Thermodynamics for engineers" (100+ students, 6 lectures)	Fall 2013
Teaching assistant: UCSB, "Thermodynamics for engineers" (100+ students)	Fall 2012

Mentoring and Outreach

Supermentor/program coordinator:

Jack Kent Cooke Bridges for Engineering and Science Transfers, UCSB	Summer 2014
Condor Techs program, UCSB	Summer 2014

Research mentor:

Independent studies of two high-school students, MSKCC	Summer 2016
Independent studies of a high-school student and a medical student, MSKCC	Summer 2015
Independent studies of two postgraduate researchers, UCSB	Summer 2014
Jack Kent Cooke Bridges for Engineering and Science Transfers, UCSB	Summer 2013
Condor Techs program, UCSB	Summer 2013
SABRE program, UCSB	Summer 2012

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