

# Stanford

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## Antonio Ricco

Research Technical Manager 2, Electrical Engineering - Integrated Circuits Laboratory

Curriculum Vitae available Online

### Bio

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#### BIO

Tony Ricco received BS and PhD degrees in Chemistry from UC Berkeley (1980) and MIT (1984), respectively. In Sandia National Laboratories' Microsensor R&D Department (1984 – 1998), he developed chemical microsensors and integrated microsystems. He was guest professor at the University of Heidelberg's Applied Physical Chemistry Institute (winter 1996 – 1997). From 1999 – 2003, he was ACLARA BioSciences' Director of Microtechnologies and Materials, developing consumable plastic microfluidic systems for genetic analysis, high-throughput pharmaceutical discovery, proteomics, and pathogen detection. He directed Stanford's National Center for Space Biological Technologies from 2004 – 2007; since 2007, he has served as NASA Ames Research Center's Chief Technologist for Small Payloads while on assignment from Stanford University. From 2003 - 2016, he was a founding member, then adjunct professor, at the Biomedical Diagnostics Institute (BDI, Dublin City University), developing single-platform point-of-care medical diagnostic devices for platelet function, infectious disease, and cardiovascular health.

Dr. Ricco is co-author of some 400 presentations, 250 publications, and 20 patents. He is a Fellow of the American Institute for Medical & Biological Engineering (AIMBE) and of The Electrochemical Society (ECS), former president of ECS's Sensor Division, and, since 2004, Vice President of the Transducer Research Foundation (TRF). He has been an editor of the Journal of Microelectromechanical Systems (JMEMS) since 2000.

At NASA, Tony works with teams that develop, launch, and operate remote, autonomous bioanalytical and spectroscopy systems for fundamental space biological and astrobiological studies, serving as chief technologist for multiple successful "cubesat" spaceflight missions incorporating living organisms. He is presently adapting these spaceflight technologies to the challenge of searching for molecular indicators of the presence of life on our solar system's "icy worlds", in particular Europa, Enceladus, and Mars' permafrost regions.

#### CURRENT ROLE AT STANFORD

On assignment to NASA Ames Research Center as Chief Technologist for Small Payloads

#### EDUCATION AND CERTIFICATIONS

- BS, UC Berkeley , Chemistry (1980)
- PhD, MIT , Chemistry (1984)

#### Publications

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#### PUBLICATIONS

- Identification and Quantitation of Aqueous Single- and Multianalyte Solutions of the Isomers Ethylbenzene, m-, p-, and o-Xylene Using a Single Specifically Tailored Sensor Coating and Estimation Theory-Based Signal Processing. *ACS sensors*

Post, N., Bender, F., Josse, F., Yaz, E. E., Ricco, A. J.

2022

- **Testing the NASA BioSentinel Pixel Dosimeter Using Gamma-ray and Neutron Sources at the LLNL Calibration Lab.** *Health physics*  
Homan, J., Lusby, T. C., Ricco, A. J., Mintz, J. L., Braby, L. A., Straume, T.  
2022; 122 (2): 344-348
- **Application-Specific Adaptable Coatings for Sensors: Using a Single Polymer-Plasticizer Pair to Detect Aromatic Hydrocarbons, Mixtures, and Interferents in Water with Single Sensors and Arrays.** *ACS sensors*  
Post, N., Bender, F., Josse, F., Ricco, A. J.  
1800
- **Microfluidics Microbial Activity MicroAssay: An Automated In Situ Microbial Metabolic Detection System.** *Astrobiology*  
Touchette, D., Altshuler, I., Raymond-Bouchard, I., Fernandez-Martinez, M. A., Bourdages, L., O'Connor, B., Ricco, A. J., Whyte, L. G.  
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- **Response to Comments on "EcAMSat spaceflight measurements of the role of sigmas in antibiotic resistance of stationary phase Escherichia coli in microgravity".** *Life sciences in space research*  
Padgen, M. R., Parra, M. P., Ricco, A. J., Matin, A. C.  
2021; 29: 85–86
- **Carbon nanotube thermoelectric devices by direct printing: Toward wearable energy converters** *APPLIED PHYSICS LETTERS*  
Lee, H., Furukawa, N., Ricco, A. J., Pop, E., Cui, Y., Nishi, Y.  
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- **BioSentinel: A Biofluidic Nanosatellite Monitoring Microbial Growth and Activity in Deep Space.** *Astrobiology*  
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2021
- **Three-Dimensional Analysis of Particle Distribution on Filter Layers inside N95 Respirators by Deep Learning.** *Nano letters*  
Lee, H. R., Liao, L., Xiao, W., Vailionis, A., Ricco, A. J., White, R., Nishi, Y., Chiu, W., Chu, S., Cui, Y.  
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- **The EcAMSat fluidic system to study antibiotic resistance in low earth orbit: Development and lessons learned from space flight** *ACTA ASTRONAUTICA*  
Padgen, M. R., Chinn, T. N., Friedericks, C. R., Lera, M. P., Chin, M., Parra, M. P., Piccini, M. E., Ricco, A. J., Spremo, S. M.  
2020; 173: 449-459
- **BioSentinel: A 6U Nanosatellite for Deep-Space Biological Science** *IEEE AEROSPACE AND ELECTRONIC SYSTEMS MAGAZINE*  
Ricco, A., Santa Maria, S. R., Hanel, R. P., Bhattacharya, S.  
2020; 35 (3): 6-18
- **Electrochemistry for Life Detection on Ocean Worlds** *CHEMELCTROCHEM*  
Thomson, S. D., Quinn, R. C., Ricco, A. J., Koehne, J. E.  
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- **EcAMSat spaceflight measurements of the role of #s in antibiotic resistance of stationary phase Escherichia coli in microgravity.** *Life sciences in space research*  
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- **Nanosatellites for Biology in Space: In Situ Measurement of Bacillus subtilis Spore Germination and Growth after 6 Months in Low Earth Orbit on the O/OREOS Mission.** *Life (Basel, Switzerland)*  
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  - **In Vitro Measurement and Modeling of Platelet Adhesion on VWF-Coated Surfaces in Channel Flow** *BIOPHYSICAL JOURNAL*  
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  - **Payload hardware and experimental protocol development to enable future testing of the effect of space microgravity on the resistance to gentamicin of uropathogenic Escherichia coli and its sigma(s)-deficient mutant** *LIFE SCIENCES IN SPACE RESEARCH*  
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  - **Platelet behaviour on von Willebrand Factor changes in pregnancy: Consequences of haemodilution and intrinsic changes in platelet function** *SCIENTIFIC REPORTS*  
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  - **Space as a Tool for Astrobiology: Review and Recommendations for Experimentations in Earth Orbit and Beyond** *SPACE SCIENCE REVIEWS*  
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  - **Earth as a Tool for Astrobiology-A European Perspective** *SPACE SCIENCE REVIEWS*  
Martins, Z., Cottin, H., Kotler, J., Carrasco, N., Cockell, C. S., de la Torre Noetzel, R., Demets, R., de Vera, J., d'Hendecourt, L., Ehrenfreund, P., Elsaesser, A., Foing, B., Onofri, et al  
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  - **Investigation of Polymer-Plasticizer Blends as SH-SAW Sensor Coatings for Detection of Benzene in Water with High Sensitivity and Long-Term Stability** *ACS SENSORS*  
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- **Click Chemistry as an Immobilization Method to Improve Oligonucleotide Hybridization Efficiency for Nucleic Acid Assays** *Sensors and Actuators B: Chemical*  
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- **Detection and Quantification of Aromatic Hydrocarbon Compounds in Water Using SH-SAW Sensors and Estimation-Theory-Based Signal Processing** *ACS Sensors*  
Sothivelr, K., Bender, F., Josse, F., Ricco, A. J., Yaz, E. E., Mohler, R. E., Kolhatkar, R.  
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- **Examining platelet adhesion via Stokes flow simulations and microfluidic experiments.** *Soft matter*  
FitzGibbon, S., Cowman, J., Ricco, A. J., Kenny, D., Shaqfeh, E. S.  
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- **Age-related changes in platelet function are more profound in women than in men.** *Scientific reports*  
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- **Examining platelet adhesion via Stokes flow simulations and microfluidic experiments** *SOFT MATTER*  
FitzGibbon, S., Cowman, J., Ricco, A. J., Kenny, D., Shaqfeh, E. S.  
2015; 11 (2): 355-367
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- **Analysis of Binary Mixtures of Aqueous Aromatic Hydrocarbons with Low-Phase-Noise Shear-Horizontal Surface Acoustic Wave Sensors Using Multielectrode Transducer Designs** *ANALYTICAL CHEMISTRY*  
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- **Three-Dimensional Wax Patterning of Paper Fluidic Devices** *LANGMUIR*  
Renault, C., Koehne, J., Ricco, A. J., Crooks, R. M.  
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- **Identification and Quantification of Aqueous Aromatic Hydrocarbons Using SH-Surface Acoustic Wave Sensors** *ANALYTICAL CHEMISTRY*  
Bender, F., Mohler, R. E., Ricco, A. J., Josse, F.  
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- **The Organism/Organic Exposure to Orbital Stresses (O/OREOS) Satellite: Radiation Exposure in Low-Earth Orbit and Supporting Laboratory Studies of Iron Tetraphenylporphyrin Chloride** *ASTROBIOLOGY*  
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- **SEVO ON THE GROUND: DESIGN OF A LABORATORY SOLAR SIMULATION IN SUPPORT OF THE O/OREOS MISSION** *ASTROPHYSICAL JOURNAL SUPPLEMENT SERIES*  
Cook, A. M., Mattioda, A. L., Quinn, R. C., Ricco, A. J., Ehrenfreund, P., Bramall, N. E., Minelli, G., Quigley, E., Walker, R., Walker, R.

2014; 210 (2)

● **The O/OREOS mission-Astrobiology in low Earth orbit ACTA ASTRONAUTICA**

Ehrenfreund, P., Ricco, A. J., Squires, D., Kitts, C., Agasid, E., Bramall, N., Bryson, K., Chittenden, J., Conley, C., Cook, A., Mancinelli, R., Mattioda, A., Nicholson, et al  
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● **Biological System Development for GraviSat: A New Platform for Studying Photosynthesis and Microalgae in Space Life Sciences in Space Research**

Fleming, E. M., Bebout, B. M., Tan, M. X., Selch, F., Ricco, A. J.  
2014; 3: 63-75

● **Individual Platelet Adhesion Assay: Measuring Platelet Function and Antiplatelet Therapies in Whole Blood via Digital Quantification of Cell Adhesion ANALYTICAL CHEMISTRY**

Lopez-Alonso, A., Jose, B., Somers, M., Egan, K., Foley, D. P., Ricco, A. J., Ramstrom, S., Basabe-Desmonts, L., Kenny, D.  
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● **Assaying the efficacy of dual-antiplatelet therapy: use of a controlled-shear-rate microfluidic device with a well-defined collagen surface to track dynamic platelet adhesion ANALYTICAL AND BIOANALYTICAL CHEMISTRY**

Lucitt, M. B., O'Brien, S., Cowman, J., Meade, G., Basabe-Desmonts, L., Somers, M., Kent, N., Ricco, A. J., Kenny, D.  
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● **Microfluidic impedance cytometer for platelet analysis LAB ON A CHIP**

Evander, M., Ricco, A. J., Morser, J., Kovacs, G. T., Leung, L. L., Giovangrandi, L.  
2013; 13 (4): 722-729

● **CubeSats as Innovative Science Platforms JOURNAL OF SMALL SATELLITES**

Ehrenfreund, P., Quinn, R. C., Ricco, A. J.  
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● **Reactive deposition of nano-films in deep polymeric microcavities LAB ON A CHIP**

Riaz, A., Gandhiraman, R. P., Dimov, I. K., Basabe-Desmonts, L., Ducree, J., Daniels, S., Ricco, A. J., Lee, L. P.  
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● **The O/OREOS Mission: First Science Data from the Space Environment Viability of Organics (SEVO) Payload ASTROBIOLOGY**

Mattioda, A., Cook, A., Ehrenfreund, P., Quinn, R., Ricco, A. J., Squires, D., Bramall, N., Bryson, K., Chittenden, J., Minelli, G., Agasid, E., Allamandola, L., Beasley, et al  
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● **Effective Hydrodynamic Shaping of Sample Streams in a Microfluidic Parallel-Plate Flow-Assay Device: Matching Whole Blood Dynamic Viscosity IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING**

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● **Point of Care Diagnostics: Status and Future ANALYTICAL CHEMISTRY**

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● **The development of the Space Environment Viability of Organics (SEVO) experiment aboard the Organism/Organic Exposure to Orbital Stresses (O/OREOS) satellite PLANETARY AND SPACE SCIENCE**

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● **The ORGANIC experiment on EXPOSE-R on the ISS: Flight sample preparation and ground control spectroscopy ADVANCES IN SPACE RESEARCH**

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- **Stand-alone self-powered integrated microfluidic blood analysis system (SIMBAS) LAB ON A CHIP**  
Dimov, I. K., Basabe-Desmonts, L., Garcia-Cordero, J. L., Ross, B. M., Ricco, A. J., Lee, L. P.  
2011; 11 (5): 845-850
- **Microfluidic device to study arterial shear-mediated platelet-surface interactions in whole blood: reduced sample volumes and well-characterised protein surfaces** *BIOMEDICAL MICRODEVICES*  
Kent, N. J., Basabe-Desmonts, L., Meade, G., MacCraith, B. D., Corcoran, B. G., Kenny, D., Ricco, A. J.  
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- **Microfluidic sedimentation cytometer for milk quality and bovine mastitis monitoring** *BIOMEDICAL MICRODEVICES*  
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- **Detection of Water in the LCROSS Ejecta Plume** *SCIENCE*  
Colaprete, A., Schultz, P., Heldmann, J., Wooden, D., Shirley, M., Ennico, K., Hermalyn, B., Marshall, W., Ricco, A., Elphic, R. C., Goldstein, D., Summy, D., Bart, et al  
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- **Integrated system investigating shear-mediated platelet interactions with von Willebrand factor using microliters of whole blood** *ANALYTICAL BIOCHEMISTRY*  
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- **Liquid recirculation in microfluidic channels by the interplay of capillary and centrifugal forces** *MICROFLUIDICS AND NANOFUIDICS*  
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- **Single-Step Separation of Platelets from Whole Blood Coupled with Digital Quantification by Interfacial Platelet Cytometry (iPC)** *LANGMUIR*  
Basabe-Desmonts, L., Ramstrom, S., Meade, G., O'Neill, S., Riaz, A., Lee, L. P., Ricco, A. J., Kenny, D.  
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- **Optically addressable single-use microfluidic valves by laser printer lithography** *LAB ON A CHIP*  
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- **Evolving Point-of-Care Diagnostics Using Up-Converting Phosphor Bioanalytical Systems** *ANALYTICAL CHEMISTRY*  
Ouellette, A. L., Li, J. J., Cooper, D. E., Ricco, A. J., Kovacs, G. T.  
2009; 81 (9): 3216-3221
- **Optical scanner for immunoassays with up-converting phosphorescent labels** *IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING*  
Li, J. J., Ouellette, A. L., Giovangrandi, L., Cooper, D. E., Ricco, A. J., Kovacs, G. T.  
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- **Integrated microfluidic tmRNA purification and real-time NASBA device for molecular diagnostics** *LAB ON A CHIP*  
Dimov, I. K., Garcia-Cordero, J. L., O'Grady, J., Poulsen, C. R., Viguier, C., Kent, L., Daly, P., Lincoln, B., Maher, M., O'Kennedy, R., Smith, T. J., Ricco, A. J., Lee, et al  
2008; 8 (12): 2071-78
- **Autonomous genetic analysis system to study space effects on microorganisms: Results from orbit** *14th International Conference on Solid-State Sensors, Actuators and Microsystems/21st European Conference on Solid-State Transducers*  
Ricco, A. J., Hines, J. W., Piccini, M., Parra, M., Timucin, L., Barker, V., Storment, C., Friedericks, C., Agasid, E., Beasley, C., Giovangrandi, L., Henschke, M., Kitts, et al

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2003; 75 (17): 4591–98
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2003; 3 (2): 86–92
- **Mars Atmospheric Oxidant Sensor (MAOS): an In-Situ Heterogeneous Chemistry Analysis** *PLANETARY AND SPACE SCIENCE*  
Zent, A. P., Quinn, R. C., Grunthaner, F. C., Hecht, M. H., Buehler, M. G., McKay, C. P., Ricco, A. J.  
2003; 51 (3): 167–175
- **Miniaturized capillary isoelectric focusing in plastic microfluidic devices** *ELECTROPHORESIS*  
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2002; 23 (20): 3638–45
- **Plastic advances microfluidic devices.** *ANALYTICAL CHEMISTRY*  
Boone, T., Fan, Z. H., Hooper, H., Ricco, A., Tan, H. D., Williams, S.  
2002; 74 (3): 78A–86A
- **Use of linear salvation energy relationships for modeling responses from polymer-coated acoustic-wave vapor sensors** *ANALYTICAL CHEMISTRY*  
Hierlemann, A., Zellers, E. T., Ricco, A. J.  
2001; 73 (14): 3458–66
- **Plastic Microfluidic Systems for High Throughput Genomic Analysis and Drug Screening** *JALA: Journal of the Association for Laboratory Automation*  
Cronin, M. T., Boone, T., Sassi, A. P., Tan, H., Xue, Q., Williams, S. J., Ricco, A. J., Hooper, H. H.  
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- **Differentiation of chemical components in a binary solvent vapor mixture using carbon/polymer composite-based chemiresistors** *ANALYTICAL CHEMISTRY*  
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