

Dr. Jose Clemente Contreras-Naranjo

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EDUCATION

Ph.D. in Chemical Engineering

Texas A&M University, College Station, TX

Dissertation: Interference-based investigation of microscopic objects near surfaces: a view from below

Graduation: December 2013

Overall GPA: 3.88/4.00

B.S. in Chemical Engineering

Universidad Industrial de Santander, Bucaramanga, Colombia

Graduation: December 2005

Overall GPA: 4.64/5.00

Summa Cum Laude

RESEARCH EXPERIENCE

Postdoctoral Research Scholar

February 2014 – Present

Professor Ozcan Research Lab, Electrical Engineering Department

UCLA, Los Angeles, CA

- Study the directed motion of nanoparticles and viruses on a chip.

Graduate Research Assistant

March 2006 – December 2013

Artie McFerrin Department of Chemical Engineering

Texas A&M University, College Station, TX

- Studied the practical implementation of reflection interference contrast microscopy (RICM) to determine the three-dimensional position and shape of microscopic objects close to a substrate.
- Reviewed and improved the full non-planar interface image formation theory of RICM, and formulated a simplified non-planar image formation model.
- Implemented and validated RICM intensity computations from double layer systems such as vesicles.
- Developed a fast and nanometer-scale resolution surface profile reconstruction procedure based on a novel analysis of RICM interferograms.
- Obtained unique observations of contact phenomena such as capillary condensation underneath micron-size glass beads and different deposition scenarios of particles on surfaces using RICM.
- Performed size and surface roughness measurements of micron-size particles using RICM.

TEACHING EXPERIENCE

Graduate Teaching Assistant (Volunteer)

Fall 2013

Artie McFerrin Department of Chemical Engineering

Texas A&M University, College Station, TX

- Graded reports, gave a few lectures, and assisted undergraduate students during the computer lab corresponding to the Process Dynamics and Control course with Professor Carl D. Laird.
- Gave a lecture and assisted undergraduate students in the Elementary Chemical Engineering course with Professor James C. Holste.

Mentor

Summer 2011, Fall 2012-Spring 2013

Professor Ugaz Research Lab, Artie McFerrin Department of Chemical Engineering
Texas A&M University, College Station, TX

- Supervised and mentored an undergraduate student for the completion of his Undergraduate Research Scholar Thesis titled “Surface roughness and size measurements of microscopic particles by reflection interference contrast microscopy” and during his Research Experiences for Undergraduates program.

Graduate Teaching Assistant

Spring 2011

Artie McFerrin Department of Chemical Engineering
Texas A&M University, College Station, TX

- Graded reports and assisted undergraduate students during the computer lab corresponding to the Process Integration, Simulation and Economics course with Professor Lale Yurttas.
- Awarded the 2011 “TA of the year” by Chemical Engineering Students at Texas A&M University.

Undergraduate Teaching Assistant

2005

Chemical Engineering Department
Universidad Industrial de Santander, Bucaramanga, Colombia

- Graded assignments and exams of undergraduate students in the course of Process Control with Professor Edgar Fernando Castillo-Monroy.

PROFESSIONAL SKILLS

Spoken and Written Languages: English (Fluent), Spanish (Native)

Computer Knowledge: Advanced MATLAB, ImageJ, RSoft, Aspen Plus, Microsoft Office 2010, Microsoft Excel VBA

Instrumentation Knowledge: RICM, optical microscopy

HONORS

- Lino de Pombo National Award for Outstanding Engineering Student, Colombia 2006
- Outstanding Student Scholarship 2000-2005, Universidad Industrial de Santander, Colombia

PUBLICATIONS

Contreras-Naranjo, J. C. and Ugaz, V. M., “A nanometre-scale resolution interference-based probe of interfacial phenomena between microscopic objects and surfaces” *Nature Communications*, doi:10.1038/ncomms2865 (2013).

Contreras-Naranjo, J. C., Silas, J. A., and Ugaz, V. M., “Reflection interference contrast microscopy of arbitrary convex surfaces” *Applied Optics* 49, 3701-3712 (2010).

Contreras-Naranjo, J. C., Chang, J., and Ugaz, V. M., “Interference-based measurements on microspheres: radius, local curvature and roughness determination” In preparation (2014).

PRESENTATIONS

(11) “Local deformation and contact phenomena of microscopic objects near surfaces: a view from below” by **Contreras-Naranjo, J. C.** and Ugaz, V. M., **oral presentation** at the 2013 AIChE Annual Meeting (San Francisco, CA), November 2013.

- (10) “Interference-based characterization of microspheres: radius, local curvature and roughness determination” by **Contreras-Naranjo, J. C.**, Chang, J. and Ugaz, V. M., **oral presentation** at the 2013 AIChE Annual Meeting (San Francisco, CA), November 2013.
- (9) “Particle deposition and potential resuspension studies inside microchannels by reflection interference contrast microscopy” by **Contreras-Naranjo, J. C.** and Ugaz, V. M., **poster presentation** at the 2012 AES Electrophoresis Society Annual Meeting (Pittsburgh, PA), October 2012.
- (8) “Micron-size particle deposition scenarios by reflection interference contrast microscopy” by **Contreras-Naranjo, J. C.** and Ugaz, V. M., **poster presentation** at the 2012 AIChE Annual Meeting (Pittsburgh, PA), October 2012.
- (7) “Reflection interference contrast microscopy: a new tool to study particle-surface interactions and interfacial phenomena” by **Contreras-Naranjo, J. C.** and Ugaz, V. M., **oral presentation** at the 2011 AIChE Annual Meeting (Minneapolis, MN), October 2011.
- (6) “Using reflection interference contrast microscopy to study micron-size aerosols on surfaces” by **Contreras-Naranjo, J. C.**, King, M. D., Hassan, Y. A., and Ugaz, V. M., **poster presentation** at the 2011 AIChE Fluid Mechanics (Minneapolis, MN), October 2011. Awarded **second place** in the Fluid Mechanics Poster Session Student Competition.
- (5) “Reflection interference contrast microscopy: a new tool to probe particle-surface interactions” by **Contreras-Naranjo, J. C.**, King, M. D., Hassan, Y. A., and Ugaz, V. M., **oral presentation** at the 30th AAAR Annual Conference (Orlando, FL), October 2011.
- (4) “Using reflection interference contrast microscopy to study micron-size aerosols on surfaces” by **Contreras-Naranjo, J. C.**, King, M. D., Hassan, Y. A., and Ugaz, V. M., **poster presentation** at the 30th AAAR Annual Conference (Orlando, FL), October 2011.
- (3) “Accurate measurements of shear induced vesicle deformation by reflection interference contrast microscopy” by **Contreras-Naranjo, J. C.** and Ugaz, V. M., **poster presentation** at the 82nd Society of Rheology Annual Meeting (Santa Fe, NM), October 2010. Selected as a **finalist** for the Society of Rheology Student Poster Award.
- (2) “The generalized inversion of reflection interference contrast microscopy” by **Contreras-Naranjo, J. C.**, Silas, J. A., and Ugaz, V. M., **poster presentation** at the Gordon Research Conference on Colloidal, Macromolecular & Polyelectrolyte Solutions (Ventura, CA), February 2010.
- (1) “The generalized inversion of reflection interference contrast microscopy” by **Contreras, J. C.** and Silas, J. A., **oral presentation** at the 82nd ACS Colloids and Surface Science Symposium, North Carolina State University (Raleigh, NC), June 2008.