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# Curriculum Vitae of Tonya Coffey

## Contact Information

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## Research Interests and Expertise

Nanotribology (the study of friction on the nanoscale), Tribology, Ultra High Vacuum Technology, Microscopy (specifically x-ray microscopy, scanning electron microscopy, atomic force microscopy, and scanning tunneling microscopy), and Microanalysis

## Education

North Carolina State University	1996	B.S. Physics (minors in Mathematics and Spanish)
North Carolina State University	1999	M.S. Physics
Study Abroad; Madrid; ASU	6/93—8/93	Art/Spanish
Study Abroad; London; NCSU	6/95—8/95	Art/Culture
North Carolina State University	8/04	Ph.D., physics

## Academic and Related Professional Experience

6/94—8/94	Research Experience for Undergraduates; NCSU Astrophysics; Dr. S. Reynolds
1994-1996	Teaching Assistant to University Scholars Program at N.C. State
1996-1997	Teaching Assistant in Physics Department, N.C. State
1996-6/2004	Research Assistant, N.C. State Physics Department
8/99—5/00	Preparing the Professoriate Program, N.C. State
Present	Assistant Professor, Physics Dept., Appalachian State University

## Honors and Awards

NSF DMR MRI Grant, 2008-2009; Appalachian Regional Microscopy Society's Young Investigator Award, 2007; Petroleum Research Fund Type G Grant, 2006-2008; NC Space Grant New Investigations Award, 2006-2008; University Research Council Mini-Grant, 2005; U.S. Department of Education Graduate Assistance in Areas of National Need Fellowship, Fall 1997-Spring 2000; Leadership Award for a Graduating Senior in the College of Physical and Mathematical Sciences, 1996; Graduated Summa Cum Laude, 1996; Phi Beta Kappa, 1995; Phi Kappa Phi, 1995; Order of Thirty and Three (an organization for outstanding rising juniors at N.C. State), 1994; Sigma Pi Sigma, 1995; Pi Mu Epsilon, 1995; Golden Key National Honor Society, 1995; MENSA, 1991-Present; University Scholars Program, 1992-1996; Caldwell Scholarship, 1992-1996; National Merit Scholarship Finalist, 1992; J. Motley Morehead Scholarship Finalist, 1992

## Professional Activities

American Chemical Society, 2007-Present; American Physical Society, 1998-Present; American Vacuum Society, 2002-present; Microscopy Society of America, 1997-Present; Sigma Xi, (2006-Present); Society of Physics Students, 1993-2004 (President, NCSU Chapter, 1995-1996); Graduate Physics Student Association, 1997-2004

## Selected Publications

1. "Soda Pop Fizz-ics" T. Coffey, *The Physics Teacher* **46**, 473 (2008).
2. "Using the quartz crystal microbalance to study macro- and nanoscale bubbles at solid-liquid interfaces" J. Jones and T. Coffey, proceedings of the IVC-17/ICSS-13 and ICN+T2007 Congress, *Journal of Physics: Conference Series* **100**, 072026 (2008).
3. "Diet Coke and Mentos: What is really behind this physical reaction?" T. Coffey, *American Journal of Physics* **76** (6) 551 (2008).
4. "Impact of Atomic Corrugation on Atomic Friction as Probed by QCM," T. Coffey and J. Krim, *Physical Review Letters*, **95**, 076101 (2005).
5. "QCM Studies of the Slippage of Solid and Liquid Krypton Monolayers on Metal(111) and C<sub>60</sub> Surfaces," T. Coffey and J. Krim, *Physical Review B*, **72**, 235414 (2005).
6. "C<sub>60</sub> Molecular Bearings and the Phenomenon of Nanomapping" T. Coffey and J. Krim, *Physical Review Letters*, **96**, 186104 (2006).
7. "Gas Adsorption on a C<sub>60</sub> Monolayer," R.A. Trasca, M.W. Cole, T. Coffey, and J. Krim, *Physical Review E*, **77**, 041603 (2008).
8. "Nanotribology." T. Coffey and J. Krim, in: *The Encyclopedia of Nanoscience and Nanotechnology*, American Scientific Publishers, Stevenson Ranch, California, 2004.
9. "A scanning probe and quartz crystal microbalance study of the impact of C<sub>60</sub> on friction at solid-liquid interfaces." T. Coffey, M. Abdelmaksoud, and J. Krim. *Journal of Physics: Condensed Matter* **13** (2001) 4991-4999.
10. "A scanning probe and quartz crystal microbalance study of C<sub>60</sub> on mica and Ag(111) surfaces." T. Coffey, M. Abdelmaksoud, and J. Krim, in: B. Bhushan (Ed.), *Proceedings of the NATO Advanced Study Institute on Fundamentals of Tribology and Bridging the Gap Between Macro-, Micro/Nanoscales*, Kluwer Academic Publishers, The Netherlands, 2001.
11. "Characterization of the effects of soft x-ray irradiation on polymers." T. Coffey, S. Urquhart, H. Ade. *Journal of Electron Spectroscopy and Related Phenomena* **122** (2002) 65-78.
12. "Characterization of the X1-STXM spectroscopy acquisition mode utilizing carbon dioxide." in *X-ray Microscopy and Spectromicroscopy*. A.P. Smith, T. Coffey, and H. Ade. 1996, Wurzburg, Germany: Springer-Verlag.

### **Selected Presentations**

1. "X-ray radiation damage of polymers in a scanning transmission x-ray microscope." In *EXPO: Microscopy and Microanalysis '98*. T. Coffey *et al.* 1998. Atlanta, Georgia. Springer-Verlag. (Conference Proceedings)
2. "GUF: Grand Unified Friction?" In 2000 NATO ASI on Fundamentals of Tribology and Bridging the Gap Between Macro-, Micro-, and Nanoscales. T. Coffey, M. Abdelmaksoud, and J. Krim. August 13-25, 2000, Keszthely, Hungary.
3. "The effect of C<sub>60</sub> on interfacial friction and wetting of toluene." In AVS 47<sup>th</sup> International Symposium. T. Coffey, M. Abdelmaksoud, and J. Krim. October 2-6, 2000, Boston, MA.
4. "The effect of C<sub>60</sub> on interfacial friction and wetting of toluene." In American Physical Society March Meeting 2000. T. Coffey, M. Abdelmaksoud, and J. Krim. March, 2000, Minneapolis, MN.
5. "Interfacial friction of methanol sliding on rigid vs. rotating fullerenes." In AVS 48<sup>th</sup> International Symposium. T. Coffey, M. Abdelmaksoud, and J. Krim. October 28-November 2, 2001, San Francisco, CA.
6. "Nanomorphism of C<sub>60</sub> and Hydrocarbons on Metal Surfaces." In Physical Electronics Conference. T. Coffey and J. Krim, June, 2002, Atlanta, GA.
7. "Nanomorphism of C<sub>60</sub> on Metal Surfaces," In AVS 49<sup>th</sup> International Symposium. T. Coffey, M. Abdelmaksoud, and J. Krim, November 3-8, 2002, Denver, CO.

8. "QCM Studies of Phonon and Electron Scattering Effects for Monolayer Octane/Cu(111) and Octane/Pb(111) Interfaces," In AVS 50<sup>th</sup> International Symposium. T. Coffey and J. Krim, November, 2003, Baltimore, MD.
9. "Impact of Atomic Corrugation on Sliding Friction as Probed by QCM," In AVS 50<sup>th</sup> International Symposium. T. Coffey, S. Winder, and J. Krim, November, 2003, Baltimore, MD.
10. "Nanotribology: Friction at the Nanometer Scale," In AReMS Fall Meeting, T. Coffey, October 15, 2004, Boone, NC.
11. "QCM Studies of the Slippage of Solid and Liquid Krypton Monolayers on Metal(111) and C<sub>60</sub> Surfaces," presented in a poster session on November 1, 2005 at the AVS 52<sup>nd</sup> International Symposium, T. Coffey and J. Krim, Boston, MA.
12. "Nanotribology and Nanotechnology at Appalachian State University," Gordon Conference on Tribology, at Colby College in Maine, June, 2006.
13. "Nanotribology and Nanotechnology at ASU: The Physics of Bubbles and Alcohols as Vapor Phase Lubricants for MEM," for the Chemistry Dept. for the University of Georgia in Athens, December, 2006.
14. "The Physics of Bubbles," for the Physics Dept. at Davidson College, September 2006.
15. "Using the QCM to study the formation of nanobubbles at solid/liquid interfaces," presented in a poster session July 3, 2007 at IVC International Conference, Stockholm, Sweden.
16. "Diet Coke and Mentos: What is really behind this physical reaction?" AReMS Meeting, Boone, NC, October 2007.
17. "Diet Coke and Mentos: What is really behind this physical reaction?" invited talk at UNC Charlotte, Thursday, April 3, 2008.

**M.S. Thesis Advisor:** H. Ade. *Radiation Damage to Polymers with Soft X-rays*. 1999.

**Ph.D. Thesis Advisor:** J. Krim, *Nanomorphism*, 2004.