

Applicant Information

Name: Oleksandr Kutana

Address:

Division of Chemistry and Chemical Engineering
Spalding Laboratories, Mail code 210-41
California Institute of Technology
Pasadena, CA 91125

email: kutana@cheme.caltech.edu

phone: (626)395-4283

fax: (626)568-8743

www: [http://www.che.caltech.edu
/groups/kpg/group/alex/](http://www.che.caltech.edu/groups/kpg/group/alex/)

Research

My research focuses on the theory and atomistic modeling of mechanical and chemical properties of nanoscale and biological materials with the purpose of explaining their behavior in terms of basic interatomic interactions. My recent work involved the study of mechanical deformations in carbon nanotubes and development of reactive interatomic potentials. Currently, I work on atomistic simulations using reactive potentials with the aim of elucidating the oxidation mechanisms of two- and one-dimensional nanostructures, such as graphene sheets and carbon nanotubes.

Education

2003 Ph. D., Chemistry, University of Houston, Houston, TX

Thesis title: Structure and gas adsorption kinetics for monocrystalline surfaces studied with low energy ion scattering

Thesis advisor: J. W. Rabalais

1996 B.Sc., Diploma with Honors, Theoretical Radiophysics Group, Department of Radiophysics, Kiev National T. Shevchenko University, Ukraine

Employment

2008-current Scientific Research Assistant, California Institute of Technology

2003-2008 Postdoctoral Scholar, California Institute of Technology

1999 –2003 Teaching Assistant, Research Assistant, University of Houston

1996-1998 Research Assistant, Institute of Applied Optics, Kiev, Ukraine

Awards

1. Sigma Xi Research Achievement Award (2000)
2. The Outstanding 3rd Year Graduate Student Scholarship Award (2002)

Publications

- A. Kutana, K.P. Giapis First-principles study of chemisorption of oxygen and aziridine on graphitic nanostructures (submitted)
- A. Kutana, K.P. Giapis Analytical carbon-oxygen reactive potential *J. Chem. Phys.* **128**, 234706 (2008)
- A. Kutana, K.P. Giapis Contact angles, ordering, and solidification of liquid mercury in carbon nanotube cavities *Phys. Rev. B* **76**, 195444 (2007)
- A. Kutana, K.P. Giapis A transient deformation regime in bending of single-walled carbon nanotubes, *Phys. Rev. Lett.* **97**, 245501 (2006)
- A. Kutana, K.P. Giapis, J. Y. Chen, C. P. Collier Amplitude Response of Single-Wall Carbon Nanotube Probes during Tapping Mode Atomic Force Microscopy: Modeling and Experiment, *Nano Letters* **6**, 1669 (2006)
- A. Kutana, M.J. Gordon, and K.P. Giapis Neutralization of hyperthermal Ne⁺ on metal surfaces, *Nucl. Instrum. Methods Phys. Res. B* **248**, 16 (2006)
- A. Kutana, K.P. Giapis Atomistic simulations of electrowetting in carbon nanotubes, *Nano Letters* **6**, 656 (2006)
- J.Y. Chen, A. Kutana, C.P. Collier, and K.P. Giapis Electrowetting in carbon nanotubes, *Science* **310**, 1480 (2005)
- P.A.W. van der Heide, C. Lupu, A. Kutana, J.W. Rabalais Factors affecting the retention of Cs⁺ primary ions in Si, *Appl. Surf. Sci.* **231**, 90 (2004)
- A. Kutana, T. Ito, I.L. Bolotin, B. Makarenko, and J.W. Rabalais TOF-SARS study of hydrogen adsorption and desorption kinetics on Si(100), *Vacuum* **73**, 73 (2004)
- A. Kutana, B. Makarenko, and J. W. Rabalais Kinetics of H atom adsorption on Si(100) at 325 - 650 K, *J. Chem. Phys.* **119**, 11906 (2003)
- I.L. Bolotin, A. Kutana, B. Makarenko, and J.W. Rabalais Scattering and recoiling mapping by SARIS for a Kr-Pt system, *Surf. Sci.* **540**, 285 (2003)

A. Kutana, I.L. Bolotin and J.W. Rabalais Universal expression for blocking cone size based on the ZBL potential, *Surf. Sci.* **495**, 77 (2001)

A. Kutana, I.L. Bolotin and J.W. Rabalais A universal expression for blocking cone size in low energy ion scattering based on MD simulations, *Computer Simulation Studies in Condensed-Matter Physics XIII*, Springer Proceedings in Physics **87**, 77 (2001)

I.L. Bolotin, A. Kutana, B. Makarenko, and J.W. Rabalais Kinetics and structure of O₂ chemisorption on Ni(111), *Surface Sci.* **472**, 205 (2001)

K.M. Lui, I.L. Bolotin, A. Kutana, V. Bykov, W.M. Lau, J.W. Rabalais How do hydrogen atoms on surfaces affect the trajectories of heavier scattered atoms? *J. Chem. Phys.* **111**, 11095 (1999)

S.A. Bugaichuk, A.G. Kutana, A.I. Khizhnyak Spatial structure of holographic gratings in photorefractive crystals with a nonlocal response, *Quantum Electronics* **27**, 727 (1997)

Conference Presentations and Talks

Year	Date	Presenter	Conference	Title
1999	May 26	I. Bolotin	Texas Surface Science Round-up	Analysis of scattered Ar and recoiled Ni and O trajectories from a Ni(111) Surface
2000	May 26	A. Kutana	Texas Surface Science Round-up	Structure of the oxygen overlayer on a Ni(111) surface
2001	Feb 21	A. Kutana	Recent Developments in Computer Simulation Studies in Condensed Matter Physics 14th Annual Workshop, University of Georgia, Athens, Georgia	A universal expression for blocking cone size in low energy ion scattering based on MD simulations
2001	May 30	A. Kutana	Texas Surface Science Round-up, Winedale historical center	MD calculations of the size and shape of the blocking cones in low energy ion scattering
2003	May 20	A. Kutana	Texas Surface Science Round-up, Winedale historical center	TOF-SARS study of isothermal hydrogen adsorption on Si(100) at 325-600 K
2003	Sep 18	P.A.W. van der Heide	The 14th International Conference on Secondary Ion Mass Spectrometry (SIMS XIV)	Factors affecting the retention of Cs ⁺ primary ions in Si
2003	Nov 3	A. Kutana	AVS 50 th International Symposium and Exhibition	Kinetics of H atom adsorption on Si(100) at 325 - 600 K

2004	Nov 15	A. Kutana	AVS 51 st International Symposium and Exhibition	Inelastic energy losses and ion yields of low energy Ar ⁺ and Ne ⁺ from transition metals
2007	Oct 15	A. Kutana	AVS 54 th International Symposium and Exhibition	Solidification and melting of mercury in nanotube cavities