

Igor Lyubinetsky

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Education

- 1986 Ph.D., Condensed Matter Physics, Leningrad State University, USSR.
1983 M.S., Physics, Leningrad State University, USSR

Professional Positions

- 2019- Visiting Scientist, Bilkent University, Ankara, Turkey
2016-18 Research Associate, Oregon State University, Corvallis, OR
2002-16 Senior Research Scientist, Pacific Northwest National Laboratory, Richland, WA.
1999-01 Research Assistant Scientist, University of Maryland, College Park, MD.
1996-99 Visiting Scientist/Research Assistant Professor, University of Pittsburgh, PA.
1989-96 Research Scientist/Senior Research Scientist/Head of Laboratory, T. Shevchenko National University, Kiev, Ukraine.
1987-89 Post-doctoral Researcher, Leningrad State University, USSR

Professional Affiliations, Service, and Distinctions

- Marie Sklodowska-Curie/TUBITAK Co-Funded Brain Circulation Fellowship , 2019
Fulbright U.S. Scholar, 2019
PNNL Outstanding Performance Award: 2009, 2008 (two), 2006, and 2003
Member of the American Vacuum, American Physical, American Chemical, Materials Research, and Ukrainian Physical Societies.
Technical Expert, International Standards Organization (ISO).

Research Interests

Dr. Lyubinetsky is interested in the surface chemistry on metal oxides relevant to heterogeneous catalysis and/or environmental remediation, using a fundamental, model system approach. He has pioneered the application of the ultra-high vacuum scanning tunneling microscopy (STM) for studies of photoreactivity on metal oxides at the atomic level. His research interests also include the structural and dynamic aspects of various processes during adsorbate-substrate interactions, fundamental aspects of TiO₂ photocatalysis and surface structure and morphology of the crystalline transitional metal oxides, alkali halides, and noble metal alloys, investigated jointly by STM and lateral averaging surface analysis techniques.

Selected Publications (out of more than 100)

(Citation *h-index*: 28)

Review papers:

1. M.A. Henderson and I. Lyubinetsky, *Molecular-Level Insights into Photocatalysis from Scanning Probe Microscopy Studies on TiO₂(110)*, Chem. Rev. **113** (2013) 4428-55 (featured on journal cover).
2. Z. Dohnálek, I. Lyubinetsky, and R. Rousseau, *Thermally-Driven Processes on Rutile TiO₂(110)-(1×1): Direct View at Atomic Scale*, Progr. Surf. Sci. **85** (2010) 161.

Twenty-five selected regular journal articles:

1. J.T. Diulus, R.T. Frederick, M. Li, D.C. Hutchison, M.R. Olsen, I. Lyubinetzky, L. Arnadottir, E.L. Garfunkel, M. Nyman, H. Ogasawara, and G.S. Herman, *Ambient-Pressure X-ray Photoelectron Spectroscopy Characterization of Radiation Induced Chemistries of Organotin Clusters*, *ACS Appl. Mater. Interfaces* **11** (2019) 2526-34.
2. R. Mu, A. Dahal, Z.-T. Wang, Z. Dohnalek, G.A. Kimmel, N.G. Petrik, and I. Lyubinetzky, *Adsorption and Photodesorption of CO from Charged Point-Defects on TiO₂(110)*, *J. Phys. Chem. Lett.* **8** (2017) 4565-72.
3. Z.-T. Wang, Y.-G. Wang, R. Mu, Y. Yoon, A. Dahal, G. Schenter, V.-A. Glezakou, R. Rousseau, I. Lyubinetzky, and Z. Dohnálek, *Probing Equilibrium of Molecular and Deprotonated Water on TiO₂(110)*, *Proc. Nat. Acad. Sci.* **114** (2017) 1801-5.
4. M.A. Henderson, A. Dahal, Z. Dohnálek, and I. Lyubinetzky, *Strong Temperature Dependence in the Sticking of H₂ on RuO₂(110)*, *J. Phys. Chem. Lett.* **7** (2016) 2967-70.
5. M.A. Henderson, R. Mu, A. Dahal, I. Lyubinetzky, Z. Dohnálek, V.-A. Glezakou, and R.J. Rousseau, *Light Makes a Surface Banana-Bond Split: Photodesorption of Molecular Hydrogen from RuO₂(110)*, *J. Am. Chem. Soc.* **138** (2016) 8714-7.
6. Y. Du, G. Li, E.W. Peterson, J. Zhou, X. Zhang, R. Mu, Z. Dohnalek, M. Bowden, I. Lyubinetzky, S.A. Chambers, *Iso-Oriented Monolayer α -MoO₃(010) Films Epitaxially Grown on SrTiO₃(001)*, *Nanoscale* **8** (2016), 3119-24.
7. R. Mu, D.C. Cantu, V.-A. Glezakou, I. Lyubinetzky, R. Rousseau, and Z. Dohnálek, *Deprotonated Water Dimers: The Building Blocks of Segmented Water Chains on Rutile RuO₂(110)*, *J. Phys. Chem. C* **119** (2015), 23552-8 (featured on journal cover).
8. Z.-T. Wang, M.A. Henderson, and I. Lyubinetzky, *Origin of Coverage Dependence in Photoreactivity of Carboxylate on TiO₂(110): Hindering by Charged Coadsorbed Hydroxyls*, *ACS Catal.* **5** (2015) 6463-7.
9. Y. Yoon, Y. Du, J.C. Garcia, Z. Zhu, Z.-T. Wang, N.G. Petrik, G.A. Kimmel, Z. Dohnalek, M.A. Henderson, R.J. Rousseau, N.A. Deskins, and I. Lyubinetzky, *Anticorrelation between Surface and Subsurface Point-Defects and Impact on Redox Chemistry at TiO₂(110)*, *ChemPhysChem* **16** (2015) 313-21 (featured on journal cover).
10. R. Mu, D.C. Cantu, X. Lin, V.-A. Glezakou, Z.-T. Wang, I. Lyubinetzky, R. Rousseau, and Z. Dohnálek, *Molecular and Dissociative Adsorption of Water on RuO₂(110)*, *J. Phys. Chem. Lett.* **5** (2014) 3445-50.
11. X. Lin, Z.-T. Wang, I. Lyubinetzky, B.D. Kay, and Z. Dohnalek, *Interaction of CO₂ with Oxygen Adatoms on Rutile TiO₂(110)*, *Phys. Chem. Chem. Phys.* **15** (2013) 6190-5 (featured on journal cover).
12. X. Lin, Y. Yoon, N.G. Petrik, Z. Li, Z.-T. Wang, V. Glezakou, B.D. Kay, I. Lyubinetzky, G.A. Kimmel, R.J. Rousseau, and Z. Dohnalek, *Structure and Dynamics of CO₂ on Rutile TiO₂(110)-1x1*, *J. Phys. Chem. C.* **116** (2012) 26322-34, (featured on journal cover).
13. Z.-T. Wang, N.A. Deskins, M. A. Henderson, and I. Lyubinetzky, *Inhibitive Influence of Oxygen Vacancies for Photoactivity of TiO₂(110)*, *Phys. Rev. Lett.* **109** (2012) 266103.
14. Z.-T. Wang, N.A. Deskins, and I. Lyubinetzky, *Direct Imaging of Site-Specific Photocatalytical Reactions of O₂ on TiO₂(110)*, *J. Phys. Chem. Lett.* **3** (2012) 102-6.
15. Y. Du, N.G. Petrik, N.A. Deskins, Z. Wang, M.A. Henderson, G.A. Kimmel, and I. Lyubinetzky, *Hydrogen Reactivity on Highly-Hydroxylated TiO₂(110) Surface Prepared via*

- Carboxylic Acid Adsorption and Photolysis*, Phys. Chem. Chem. Phys. **14** (2012) 3066-74, (featured on journal cover).
16. Z.-T. Wang, N.A. Deskins, and I. Lyubinetsky, *Direct Imaging of Site-Specific Photocatalytical Reactions of O₂ on TiO₂(110)*, J. Phys. Chem. Lett. **3** (2012) 102-6.
 17. Z. Wang, Y. Du, Z. Dohnálek, and I. Lyubinetsky, *Direct Observation of Site-Specific Molecular Chemisorption of O₂ on TiO₂(110)*, J. Phys. Chem. Lett. **1** (2010) 3524-9.
 18. Y. Du, N.A. Deskins, Z. Zhang, Z. Dohnálek, M. Dupuis, and I. Lyubinetsky, *Two Pathways for Water Interaction with Oxygen Adatoms on TiO₂(110)*, Phys. Rev. Lett. **102** (2009) 096102.
 19. Y. Du, N.A. Deskins, Z. Zhang, Z. Dohnálek, M. Dupuis, and I. Lyubinetsky, *Imaging Consecutive Steps of O₂ Reaction with Hydroxylated TiO₂(110): Identification of HO₂ and Terminal OH Intermediates*, J. Phys. Chem. C **113** (2009) 666-671 (featured on journal cover).
 20. S.-C. Li, Z. Zhang, D. Sheppard, B.D. Kay, J.M. White, Y. Du, I. Lyubinetsky, G. Henkelman, and Z. Dohnálek, *Intrinsic Diffusion of Hydrogen on Rutile TiO₂(110)*, J. Am. Chem. Soc. **130** (2008) 9080-8.
 21. Y. Du, Z. Dohnálek, and I. Lyubinetsky, *Transient Mobility of Oxygen Adatoms upon O₂ Dissociation on Reduced TiO₂(110)*, J. Phys. Chem. C **112** (2008) 2649-53 (featured on journal cover).
 22. P. Han, S. Axnanda, I. Lyubinetsky, and D.W. Goodman, *Atomic-Scale Assembly of a Heterogeneous Catalytic Site*, J. Am. Chem. Soc. **129** (2007) 14355-61.
 23. I. Lyubinetsky, A. El-Azab, A.S. Lea, S. Thevuthasan, and D.R. Baer, *Initial Stages of Oxide Nanodot Heteroepitaxial Growth: Cu₂O on SrTiO₃(100)*, Appl. Phys. Lett. **85** (2004) 4481.
 24. Y. Du, S. Atha, R. Hull, J. F. Groves, I. Lyubinetsky, and D. R. Baer, *Focused Ion Beam Directed Self-Assembly of Cu₂O Islands on SrTiO₃ (100)*, Appl. Phys. Lett. **84** (2004) 5213.
 25. D.B. Dougherty, I. Lyubinetsky, E.D. Williams, M. Constantin, C. Dasgupta, and S. Das Sarma, *Experimental Persistence Probability for Fluctuating Steps*, Phys. Rev. Lett. **89** (2002) 136102.

Ten Selected Invited Presentations

1. SABIC-CRI, Jeddah, Saudi Arabia, 2019.
2. Oregon State University, Corvallis, OR, 2016.
3. Environment & Energy Research Institute, Doha, Qatar, 2015.
4. Katholieke Universiteit Leuven, Belgium, 2014.
5. 246rd ACS National Meeting, Indianapolis, IN, 2013.
6. Gordon Research Conference on Chemical Reactions at Surfaces, Les Diablerets, Switzerland, 2013.
7. CIC Energigune, Minano, Spain, 2013.
8. 243rd ACS National Meeting, San Diego, CA, 2012.
9. University College, London, UK, 2011.
10. Fritz Haber Institute, Berlin, Germany, 2010.