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Joshua Jortner Distinguished Lectures in Chemistry of The Raymond and Beverly Sackler Foundation

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TEL AVIV UNIVERSITY אוניברסיטת תל אביב

הרצאות מיוחדות בכימיה
על שם יהושע יורטנר
נתרמו ע"י ריימונד ובברלי סאקלר

Joshua Jortner
Distinguished Lectures in Chemistry
Endowed by Raymond and Beverly Sackler

Marsha I. Lester **מרשה לסטר**
Edmund J. Kahn Distinguished Professor פרופסור ע"ש ג'. קאהן
Department of Chemistry המחלקה לכימיה
University of Pennsylvania, USA אוניברסיטת פנסילבניה, ארה"ב

Lecture **הרצאה**

EXPLORING UNCHARTED REGIONS OF ATMOSPHERIC REACTION PATHWAYS

The lecture will take place on Thursday, 19 May 2016, at 16:00, Melamed Hall (6), Shenkar Physics building, Tel-Aviv University, Ramat-Aviv

ההרצאה תתקיים ביום חמישי, 19 במאי 2016, בשעה 16.00, אולם מלמד (6), בניין שנקר לפיסיקה, אוניברסיטת תל-אביב, רמת-אביב

Light refreshments will be served before the lecture *כיבוד קל יוגש לפני ההרצאה*

Abstract

Alkene ozonolysis is a primary oxidation pathway for alkenes emitted into the troposphere and also an important source of atmospheric hydroxyl radicals. Alkene ozonolysis takes place on a reaction path with multiple minima and barriers along the way to OH products. In particular, a key reaction intermediate, known as the Criegee intermediate, R_1R_2COO, had eluded detection until very recently. In this laboratory, the simplest Criegee intermediate, CH_2OO, and methyl-substituted Criegee intermediates, CH_3CHOO and $(CH_3)_2COO$, have now been generated by an alternative synthetic route, detected by VUV photoionization, and characterized on a strong p*¬p transition. Most recently, our studies have focused on vibrational activation of methyl-substituted Criegee intermediates in the vicinity of the barrier for 1,4 hydrogen transfer that leads to OH products. The experiments reveal infrared transitions in the CH stretch overtone region that initiate unimolecular decay as well as the rate of the appearance of OH products through direct time-domain measurements. Comparison with high level theory shows that tunneling through the barrier makes a significant contribution to the decay rate. The dissociation dynamics are also examined through the translational and internal energy distributions of the OH products, which reflect critical configurations along the reaction pathway from the barrier for hydrogen transfer to OH products. Finally, the results will be extended to thermally averaged unimolecular decay of stabilized Criegee intermediates under atmospheric conditions.

Professor Joshua Jortner was born in Poland in 1933 and immigrated to Israel in 1940. He received his Ph.D. from the Hebrew University of Jerusalem in 1960. In 1964 he was appointed to a professorship in the Department of Chemistry at Tel Aviv University and served as its first chairman. From 1966-72 he served as Deputy Rector, Acting Rector and Vice President of Tel Aviv University. From 1973-2003 he held the position of the Heinemann Professor of Chemistry at the School of Chemistry, The Raymond and Beverly Sackler Faculty of Exact Sciences of Tel Aviv University. He has held visiting Professorships at the University of Chicago, the University of Copenhagen, and the University of California, Berkeley. In 1995 he was the Christensen Visiting Fellow, St. Catherine's College, Oxford, and in 1998 he served in the International Research Chair "Blaise Pascal" of the Fondation de l'École Normale Supérieure, France. Jortner holds honorary doctorates from the Ben Gurion University of the Negev, Israel (1985); the Pierre and Marie Curie University of Paris, France (1986); the Technical University of Munich, Germany (1996); the Technion, Israel Institute of Technology, Haifa, Israel (2005); the Weizmann Institute of Science, Rehovot, Israel (2005); the Free University of Berlin, Germany (2005); and the Humboldt University of Berlin, Germany, (2003). Among his awards are the International Academy of Quantum Science Award (1972), the Weizmann Prize (1973), the Rothschild Prize (1976), the Kolthof Prize (1976), the Israel Prize in Exact Sciences (1982), the Wolf Prize in Chemistry (1988), the Honorary J. Heyrovsky Medal (1993), the August Wilhelm von Hofmann Medal (1995), the Joshua Jortner Distinguished Lectures in Chemistry Endowed by Raymond and Beverly Sackler (1997), the Robert S. Mulliken Medal (1999), the Joseph O. Hirschfelder Prize (1999), the Maria Sklodowsky-Curie Medal of the Polish Chemical Society (2003), the Medal of the Israeli Chemical Society (2004), the Joshua Jortner Chair in Chemistry endowed by Raymond and Beverly Sackler (2007), the Lise Meitner Research Award of the Alexander von Humboldt Foundation (2007), and the EMET Prize in Exact Sciences: Chemistry (2008). A member of the Israeli Academy of Sciences and Humanities, Jortner is a foreign honorary member of the Academies of Sciences of Denmark, Poland, Romania, Russia, India, the Netherlands, the Czech Republic and the Italian Accademia Nazionale dei Lincei. He is a member of the International Academy of Quantum Molecular Sciences, the Academia Scientiarium et Artium Europaea and the Leopoldina National Academy of Germany. He is a Foreign Honorary Member of the American Philosophical Society, the American Academy of Arts and Sciences and the National Academy of Sciences of the United States of America. He held many honorary lectureships in Europe, Asia, the United States and Israel.
Jortner served as President of the Israel Academy of Sciences and Humanities (1986-1995), served as the Founding President of the Israel Science Foundation, and acted as Science Advisor to the Prime Ministers of Israel, Shamir, Rabin and Peres. He served as the President of the International Union of Pure and Applied Chemistry (1998-2000).

His research centers on the exploration of the phenomena of energy acquisition, storage and disposal in isolated molecules, clusters, condensed phases and biophysical systems. Jortner is the author of over 735 scientific publications, and the author and editor of 28 books.

Professor Marsha I. Lester, guest lecture at the Joshua Jortner Distinguished Lectures in Chemistry of the Raymond and Beverly Sackler Foundation 2015/2016, has risen through the academic ranks at the University of Pennsylvania, where she is currently the Edmund J. Kahn Distinguished Professor in the Department of Chemistry of the School of Arts & Sciences. She completed a four-year term as Chair of the Department of Chemistry in 2009. Lester has received many honors and awards, including her election to Fellowship in the American Academy of Arts & Sciences, the Garvan-Olin Medal of the American Chemical Society, the Bourke Lectureship of the Faraday Division of the Royal Society of Chemistry, a John Simon Guggenheim Memorial Foundation Fellowship, Fellow of the American Association for the Advancement of Science, the American Chemical Society, and the American Physical Society, an Alfred P. Sloan Research Fellowship, and the Dreyfus Teacher-Scholar Award.

In 2008, Lester was appointed Editor of *The Journal of Chemical Physics*, the preeminent journal in her field. In the past seven years, she has reinvigorated the Journal with numerous initiatives to attract more of the best papers in the broadly defined field of chemical physics. Lester has consistently devoted a substantial amount of her time to scientific service activities. She has served on the NRC Commission on Physical Sciences, Mathematics, and Applications as well as its Board on Chemical Sciences and Technology. She has been engaged in activities of the American Chemical Society, the American Physical Society, the National Science Foundation, and the Department of Energy. She is also a founding member of the Penn Forum for Women Faculty.

Lester's research group has developed innovative methods for stabilizing 'entrance channel complexes' and reaction intermediates of environmental significance. Her group has employed novel spectroscopic methods to rigorously characterize these important, yet previously uncharted, regions of chemical reaction pathways.