

G. B. FROST MEMORIAL LECTURE

The Grenville Frost Visiting Lectureship in Chemistry was established in 1966 by a bequest from the estate of the Honourable Leslie M. Frost, Premier of Ontario, in memory of his brother, Grenville. This fund is used to invite a Visiting Lecturer to Queen's.

Grenville Frost completed his education at the University of Toronto and, after graduating, went on to the University of California where he worked under the famous G.N. Lewis. Dr. Frost was appointed Lecturer at Queen's in 1924 and Full Professor in 1944. He became Head of the Department of Chemistry in 1956 and served in this post until retirement in 1961.

Dr. Frost was also the Supervisor to H.G. McAdie, who was the first Ph.D. Graduate in the Department of Chemistry

SELECTED RECENT PUBLICATIONS

- "Selective Metal-free HB(C₆F₅)₂ Catalyzed Allene Cyclotrimerization: Formation of 1,3,5-Trimethylenecyclohexane and Its Tris-hydroboration Product", X. Tao, G. Kehr, C. G. Daniliuc, G. Erker, *Angew. Chem. Int. Ed.* 2017, 56, 1376-1380.
- "CO-Reduction Chemistry: Reaction of a CO-Derived Formylhydridoborate with Carbon Monoxide, with Carbon Dioxide, and with Dihydrogen", Z. Jian, G. Kehr, C. G. Daniliuc, B. Wibbeling, T. Wiegand, M. Siedow, H. Eckert, M. Bursch, S. Grimme, G. Erker, *J. Am. Chem. Soc.* 2017, 139, 6474-6483 (doi: 10.1021/jacs.7b02548).
- "Frustrated Lewis Pair Chemistry: Searching for New Reactions", G. Kehr, G. Erker, *Chem. Rec.* 2017, 17, 803-815 (doi: 10.1002/tcr.201700010).
- "Advanced 1,1-carboboration reactions with pentafluorophenylboranes", G. Kehr, G. Erker, *Chem. Sci.* 2016, 7, 56-65 (doi: 10.1039/c5sc03282b).
- "Phospha-Claisen Type Reactions at Frustrated Lewis Pair Frameworks", G.-Q. Chen, G. Kehr, C. Mück-Lichtenfeld, C. G. Daniliuc, G. Erker, *J. Am. Chem. Soc.* 2016, 138, 8554-8559 (doi: 10.1021/jacs.6b04046).
- "Selective N,O-Addition of the TEMPO Radical to Conjugated Boryldienes", F. Türkyilmaz, G. Kehr, J. Li, C. G. Daniliuc, M. Tesch, A. Studer, G. Erker, *Angew. Chem. Int. Ed.* 2016, 55, 1470-1473 (doi: 10.1002/anie.201509114).
- "Stoichiometric Reactions and Catalytic Hydrogenation with a Reactive Intramolecular Zr+/Amine Frustrated Lewis Pair", X. Xu, G. Kehr, C. G. Daniliuc, G. Erker, *J. Am. Chem. Soc.* 2015, 137, 4550-4557 (doi: 10.1021/jacs.5b01623)
- "Frustrated Lewis Pair Chemistry: Development and Perspectives", D. W. Stephan, G. Erker, *Angew. Chem. Int. Ed.* 2015, 54, 6400-6441 (doi: 10.1002/anie.201409800).

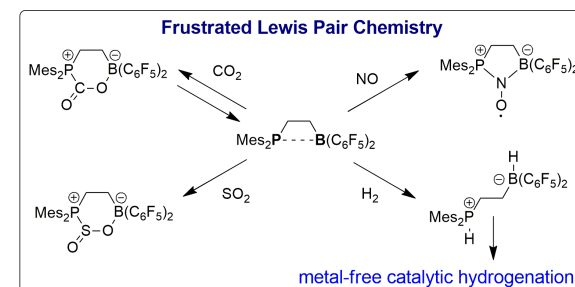


Department of Chemistry
Queen's University

is honoured to host the
2018 Frost Lecturer:

Dr. Gerhard Erker
Universität Münster

"Frustrated Lewis Pair Chemistry:
Searching for New Reactions"



Friday, March 16, 2018
11:30 AM
Room 117, Chernoff Hall

DR. GERHARD ERKER



Gerhard Erker

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Germany

Gerhard Erker has been a Professor and Director at the Organic Chemistry Institut of the Universität Münster, Germany, since 1990. Since 2015 he is a Senior Professor at this institution. He is also an Adjunct Professor at the University of California Santa Barbara, USA, and he holds a Concurrent Professorship at Fudan University, China. He had previously held positions at the Universität Würzburg and the Max-Planck-Institut für Kohlenforschung in Mülheim, Germany, the latter as a Heisenberg Fellow. Professor Erker is well known for his work on organometallic chemistry and catalysis as well as his contributions to main group element chemistry. Highlights include his work using the special stereoelectronic features of the Group 4 bent metallocenes for stabilizing unusual organic and organometallic compounds; notable examples are his stable planar-tetracoordinate carbon compounds, his s-trans-butadiene metallocene chemistry and his work on formaldehyde zirconocenes. This led him to the field of homogeneous metallocene olefin polymerization catalysis, where he has made numerous important contributions. This included the design and generation of a variety of new active catalyst types and detailed mechanistic work on the selective carbon-carbon bond forming process at these very active and at the same time very selective catalyst systems. One important aspect was the use of controlling substituents originating from the chiral natural pool (terpenes, steroids) at the bent metallocene frameworks. Professor Erker has developed the metallocene-borate-betaine catalysts, which are active single component catalysts that do not need external activators.

Since 2006 the Erker group is actively working in the new field of the "frustrated Lewis pairs" (FLPs). In this rapidly growing area of high current interest steric effects are utilized to generate co-existing active Lewis acids and bases in solution, which may then undergo cooperative reactions with added substrates, most notably heterolytic splitting of dihydrogen and metal-free hydrogenation catalysis. Professor Erker's group has designed and prepared a great number of active inter- and intramolecular frustrated Lewis pairs (many with P/B, N/B or even O/B combinations) which feature a great variety of reaction patterns. Some of his new systems show a metal-reminiscent coordination behavior. Many of his FLPs add to a variety of small molecules, e.g. to carbon dioxide or sulfur dioxide; they may add nitric oxide to yield a variety of novel persistent FLPNO aminoxyl radicals, they add to olefins, to acetylenes, to conjugated dienes and diynes, to various carbonyl compounds etc. etc., and they have been used as templates in carbon monoxide reduction chemistry. Quite recently Professor Erker has combined main group element FLP chemistry with the Group 4 bent metallocenes in his ongoing search for new chemical reactions. His main group element chemistry has also opened new ways to reactive phosphorus and boron species (phospho-Stork reaction, borata-alkenes). He has developed an advanced variant of the 1,1-carboboration reaction, which has directed new synthetic pathways to boroles and phospholes and offered a novel way to achieve the activation of carbon-carbon bonds.

SELECTED HONOURS & AWARDS

- The Winnacker-Stipend, the Chemistry Award of the Gottingen Academy of Science
- The Heisenberg Fellowship
- The first awardee of the Krupp-Preis for young Professors
- The Max-Planck-Forschungspreis (1993)
- The Otto-Bayer Award (1995)
- The Adolf-von-Baeyer-Denkünze from the German Chemical Society (GDCh) (2009)
- The Opolzer Lecture, Université de Genève, Switzerland (2009)
- The Werner Heisenberg-Medaille of the Alexander von Humboldt-Foundation (2011)
- The Eugen und Ilse Seibold-Preis from the Deutsche Forschungsgemeinschaft (DFG) (2011)
- The Elhuyar-Goldschmidt Award of the Real Sociedad Espanola de Quimica (2013)
- The Order of Merit of the Federal Republic of Germany (Bundesverdienstkreuz) (2014)
- Member of Nordrhein-Westfälische Akademie der Wissenschaften und der Künste (North Rhine-Westphalian Academy of Sciences and Arts)
- Member of Deutsche Akademie der Technikwissenschaften (National Academy of Science and Engineering)
- Member of Academia Europaea (The Academy of Europe)
- Member of the Nationale Akademie der Wissenschaften, Leopoldina (The German National Academy of Sciences Leopoldina)
- An Honorary Member of the Chemical Society of Japan (2017)