**Title: Bimetallic Hydroformylation: Twice the Fun?!**

**Abstract:**  Homobimetallic rhodium complexes using the binucleating tetraphosphine ligand *racemic*-(Et2PCH2CH2)(Ph)PCH2P(Ph)(CH2CH2PEt2), et,ph-P4, are highly active and selective hydroformylation catalysts for a variety of 1-alkenes. We have investigated the nature of the bimetallic cooperativity in this novel catalyst via extensive *in situ* FT-IR, NMR, kinetic, isotopic labeling experiments, and DFT computational studies, all of which indicate that the key bimetallic catalyst in acetone is a unique dicationic Rh(+2) oxidation state complex, [*rac*-Rh2(-H)2(CO)2(et,ph-P4)]2+. Unfortunately, the NMR studies clearly indicate that this catalyst system is very susceptible to deactivating fragmentation reactions.

When a 30% water/acetone solvent system is used for hydroformylation deprotonation of the dicationic dihydride species occurs generating a less active, but far more fragmentation resistant bimetallic catalyst proposed to be [Rh2(-H)(CO)2(et,ph-P4)]+, which out-preforms the dicationic catalyst. Based on the fragmentation problem a new, far more strongly coordinating P4 ligand that uses 1,2-phenylene based chelating groups has been designed, synthesized, and characterized. Studies on bimetallic complexes based on this new P4 ligand will be discussed.



**Short Bio for Prof. George G. Stanley**

Prof. Stanley received his B.S. in Chemistry from the University of Rochester (1975, senior research with Rich Eisenberg), Ph.D with F. Albert Cotton at Texas A&M University (1979), and was a NATO & CNRS Postdoctoral Fellow with John Osborn at the Université Louis Pasteur in Strasbourg, France (1979-81). He started his academic career in 1981 at Washington University in St. Louis. In 1986 he moved to Louisiana State University in Baton Rouge where he is currently the *Cyril & Tutta Vetter Alumni Professor of Chemistry*. George Chaired the Inorganic Chemistry Gordon Research Conference in 2005 and was Chair of the Organometallic subdivision of the Inorganic Chemistry division of the ACS in 2009. He is currently Chair of the Novel Chemistry with Industrial Applications subdivision of the Industrial & Engineering Chemistry (IEC) division of ACS, and is Chair-Elect for the IEC division for 2017 (Chair in 2018). Society honors include ACS Fellow (2011) and AAAS Fellow (2014). Prof. Stanley’s research interests involve bimetallic cooperativity in homogeneous catalysis, with particular emphasis on homobimetallic catalysts for carbonylations, alkene hydration/oxidation, and related reactions.