

Laboratory for the Development of Innovative Catalytic Processes and Synthetic Reactions

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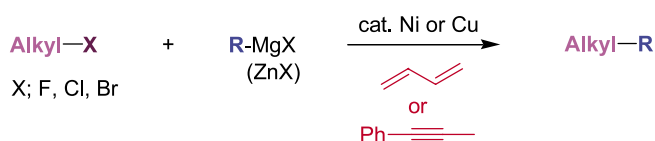
Purpose of our Study

Our research is concerned with synthetic organic chemistry and organometallic chemistry, an interdisciplinary area relating to both organic and inorganic chemistry. Our research program is focused on the development of synthetic methods based on novel strategies, transition metal catalyzed reactions that enable new transformations, the efficient utilization and revelation of organoheteroatom compounds, and elucidating the role of catalysts in chemical transformations. Some recent representative topics are:



New C-C Bond-Forming Reaction

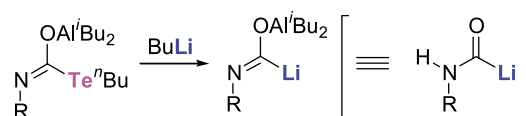
We have recently discovered quite innovative sp^3C-sp^3C cross-coupling reactions that use inexpensive metal catalysts such as Ni or Cu with the aid of 1,3-butadiene or alkyne ligands. The methodology can also be applied to the cleavage of sp^3C-F bonds, which have been considered to be among the most stable chemical bonds.



JACS, **2005**, 127, 3656; **2003**, 125, 5646; **2002**, 124, 4222.
ACIE, **2007**, 46, 2086; **2004**, 43, 6180.

Heteroatom Chemistry

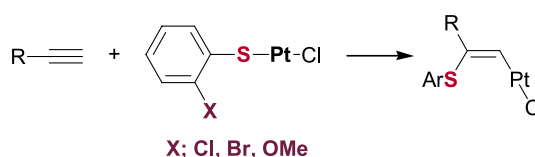
A convenient method has been developed for the generation of a synthon for carbamoyllithium having a hydrogen(s) or an aryl group on the nitrogen atom. This transformation can be realized by utilizing facile Te-Li exchange reaction based on high reactivity of organotellurium compounds towards alkyllithiums.



JACS, **2006**, 128, 12651.

S-X Bond Activation by Transition metal

We have found that the regio- and stereoselective addition of a sulfur and transition-metal bond to terminal alkynes, a process involved in a number of important catalytic reactions, can usefully be studied by using complexes with an S-Pt-Cl framework. An

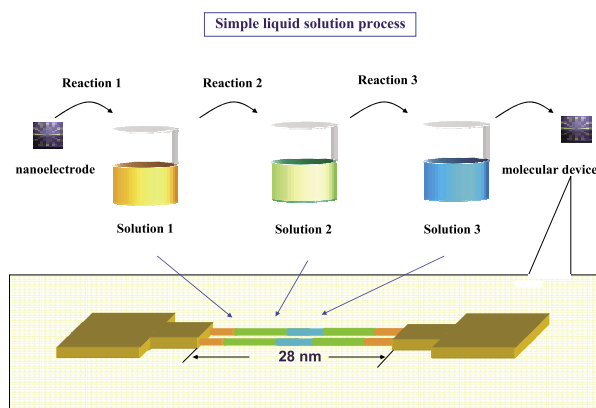


ACIE, **2007**, 46, 5929.

unexpected “*o*-halogen effect” was also revealed, i.e. facilitation by ortho-halogen substitution in the SAR group.

Material Chemistry

We have developed an interconnect method to program three kinds of component molecules with their own functions and to wire a molecular device in a self-organized manner. By using this interconnect method, we have produced conductive wires and optical switching devices, and have demonstrated the functionality of the devices. Our interconnect method allows us to control various molecular device characteristics by combining the three molecules.



JACS, 2006, 46, 12650.

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- (3) " β -cis-SAR effect" on Decarbonylation from α,β -Unsaturated Acyl and Aroyl Complexes. Kato, T.; Kuniyasu, H.; Kajiuira, T.; Minami, Y.; Ohtaka, A.; Kinomoto, M.; Terao, J.; Kurosawa, H.; Kambe, N. *Chem. Commun.* **2006**, 868-870.
- (4) Reactions of α,β -Unsaturated Thioesters with Platinum(0): Implication of a Dual Mechanism Leading to the Formation of Acyl Platinum. Minami, Y.; Kato, T.; Kuniyasu, H.; Terao, J.; Kambe, N. *Organometallics* **2006**, *25*, 2949-2959.
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- (7) Self-Organized Interconnect Method for Molecular Devices. Taniguchi, M.; Nojima, Y.; Yokota, K.; Terao, J.; Sato, K.; Kambe, N.; Kawai, T. *J. Am. Chem. Soc.* **2006**, *128*, 15062-15063.
- (8) N-Carbonylation of Lithium Azaenolates of Amides, Formamides, Ureas, and Carbamates with Carbon Monoxide Mediated by Selenium. Fujiwara, S.-I.; Okada, K.; Shikano, Y.; Shimizu, Y.; Terao, J.; Kambe, N.; Sonoda, N. *J. Org. Chem.* **2007**, *72*, 273-276.
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- (12) Definitive Evidence for the Insertion of Terminal Alkynes into ArylS-Pt Bonds: "*o*-Halogen Effect" in Stoichiometric and Catalytic Reactions. Kuniyasu, H.; Yamashita, F.; Terao, J.; Kambe, N. *Angew. Chem., Int. Ed.* **2007**, *46*, 5929-5933.