

Ei-ichi negeshis negeshi coupling essay samples

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Ei-ichi Negishi is a Nobel Prize winner in Organic Chemistry in 2010 for palladium catalyzed cross couplings in organic chemistry. The Nobel Prize for Organic Chemistry that he won is being shared to his other colleagues Richard Heck and Akira Suzuki. Ei-ichi Negishi is a Japanese citizen that was born in China. They transferred to Seoul, North Korea and experienced most of his childhood days in Korea then later they transferred to Japan. Accordingly, Negishi's motivation in developing his self-discipline as a student happened when he experienced being in the 123rd place in their classroom. He then realized that, if he don't study hard, his chance of entering the University of Tokyo would be beyond his reach. Thus, he pressured his mental capacity during the two-day entrance exam for the University. He barely passed the exam and he was one of the youngest students that made it through the stringed Japanese system . . . He had a good training in his college in Japan where he became a good student in his teens preparing him for his profession in the field of research. He has built a firm foundation in the science and engineering that made him what he is right now.

(Negishi).

The study of Negishi together with his 2 companions that won them a Nobel Prize is a very important study that contributed to the organic chemistry. There is a large number of organic reactions in the biochemical processes that are catalyzed. Aside from the usual catalysts in the Lewis bases and acids, enzymes, the transition metal and their complexes provides a helpful group as a catalyst. The research of Negishi is directed to the following objectives:

- The discovery as well as the development of the transition metal-catalyzed organic reactions
- The applications of the organic transformations that would contribute to the fields of health, energy, and other related areas
- The development of polymers and other materials in chemistry that is based on the organotransition of the metal chemistry

The discovery of the Zr-catalyzed carboalumination as well as the Pd-catalyzed cross coupling and the development of such specific study provide a synthesis of Vitamin that is very stereoselective. The research was able to discover the Zr-promoted bicyclization reaction. Other catalytic developments and asymmetric reactions that involve the reaction with Zr are being discovered until now. The Pd-catalyzed cross coupling as well as the acylpalladation that the research developed paved way to the Azipper-mode cascade carbopalladation development. This study hopefully provides a powerful tool for the cyclization and the preparation of the oligo- and polyacetylenes for conductive polymers (Purdue University).

The research of the Palladium-Catalyzed Cross Coupling that won the Nobel Prize in 2010 contributed to the further development of the platinum-based homogenous catalysis for the organic synthesis. Negeshi's reaction that has been developed for already 3 decades (1976) has been carried out for in many organic solvents. The research that has won the Nobel Prize is emphasized in the "greener" organic processes by minimizing the organic wastes found in the organic solvents. Negeshi particularly discovered the combination of organoaluminum and the nickel. After long years of research he already had a number of combinations that provides for a high yield and

high selectivity. The reactions involving zinc, zirconium and aluminum are referred to as the Negeshi coupling. The Negeshi cross-coupling reactions that Negeshi discovered is the organic reaction of organozinc compound with the organohalide to synthesis the coupled product with the use of nickel or palladium catalyst. The catalysis of the palladium starts with the oxidative addition of the organohalide to the complexes of Pd(0) and Pd(II). The organozinc transmetalation then in which the R group of the organozinc reagent would replace the halide ion in the palladium complex to make the zinc(II) halide salt. The process of reductive elimination then follows that yields the final coupled product, regenerating the catalysts, and the catalytic cycle begins again (King et al). The Negeshi coupling is a very contributory key to the synthesis of natural product hennoxazole A , which is a marine antiviral compound. It presents examples of the presence of highly sensitive functional groups which requires mild reactions conditions.

The road to the success of Negeshi that led to the winning of the Nobel Prize is rather not immediate. In fact, Negeshi admits that he had quite a number of clumsy experiments. The many aspects of organic synthesis became a puzzle that he was obsessed to finish. When he joined the H. C Brow group in 1966, he was given freedom to pursue his dreams. He ventured the d-block transition metals to make as catalysts to promote main-group metal containing organometallic reactions. Thus, he was able to get the stoichiometric reactions of the organotransition metals that contains Ni, Cu, Pd, and others (Negeshi).

The Nobel Prize that Negeshi won is a prize that he deserved. Their research that involves catalytic processes that allows the synthesis of other materials

is a big contribution in the organic chemistry. Donald Craig of the Imperial College London commented that “ They developed a new paradigm for making carbon bonds with reactions that were simply not known. It has become a very reliable, easy, and convenient way of joining building blocks of larger molecules and is now absolutely part of the lexicon of the organic chemist that will be used thousands of times a day worldwide” (Royal Society of Chemistry). The researches that Negeshi and the others have done are important contributions in the real world applications in the fields of electronics, pharmaceuticals, fine chemicals and agrochemicals. There are still a lot of researches that strives to discover profound innovations. The researches of Negeshi and the others with him are stepping stones for the other researchers in the further study of organic chemistry. There is a significant increase in field of organic chemistry particularly in the coupling reactions which contributed to the field in big ways. According to K. C Nicolaous, “ In the last quarter of 20th century, a new paradigm for carbon-carbon bond formation has emerged that has enabled considerably the prowess of synthetic organic chemists to assemble complex molecular frameworks and has changed the way we think about synthesis” (Colacot).

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