



ORAL DEFENCE ANNOUNCEMENT



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Enantioselective Addition-Alkylation Reactions via Bisguanidinium Silicate Ion Pair Catalysis

Enantioselective addition-alkylation reactions via bisguanidinium silicate ion pair catalysis was described in this work. Silicon hydrides, alkynylsilanes and alkoxy silanes were activated by fluoride in the presence of bisguanidinium catalysts to form hypervalent silicate ion pairs. These activated silicates then undergo 1,4-additions with chromones and coumarins, generating enolsilicate intermediates, for a consequent stereoselective alkylation reaction. The reductive-alkylation reaction, proceeded under mild conditions using polymethylhydrosiloxane (PMHS), a cheap and environmentally-friendly hydride source. The addition-alkylation reactions with alkynylsilanes and alkoxy silanes resulted in the construction of two vicinal chiral carbon centers with excellent enantioselectivities and diastereoselectivities (up to 99% ee, > 99:1 dr). DFT calculations and experimental NMR studies revealed that penta-coordinated silicates are the crucial intermediates.

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Supervisor: Prof Tan Choon Hong