"**Oxygen Driven Fragment Coupling for the Synthesis of Natural Products and Antibacterials**"

**Abstract:**

Nature uses oxidative couplings to construct carbon-carbon, carbon-oxygen, and carbon-nitrogen bonds with a high degree of efficiency. Surprisingly, few laboratory equivalents are as selective or as efficient as the biological versions. The use of parallel microscale screening to discover selective and efficient catalysts for such processes using oxygen as the terminal oxidant will be discussed. The unexpected outcomes obtained highlight the value of interrogating large numbers of rationally selected variables under the umbrella of general hypothesis. The development of selective oxidative catalytic processes for phenol coupling, enol coupling, and alkyl C H activation will be discussed. Applications in total synthesis of hypocrellin, honokiol, chaetoglobin, and pyrolaside B will be presented. Finally, studies on the mechanisms of these transformations will be described with the goal of understanding the

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