

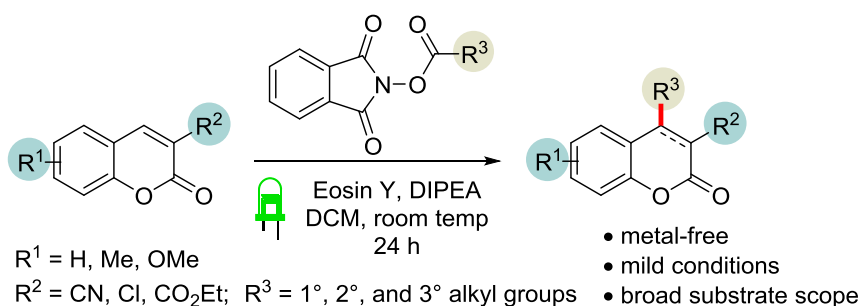
Selective C-C bond formation through Photoredox Catalysis

Ravi P Singh*

Department of Chemistry
Indian Institute of Technology Delhi
(Email: ravips@chemistry.iitd.ac.in)

Abstract:

Photoredox catalysis has gained significant importance for the construction of a wide variety of non-traditional bond in the past few years. In fact, Coumarins, a phytochemical with wide spectrum of bioactivities have become an extremely attractive molecule. Here, a photo-induced decarboxylative 4-position alkylation of coumarins will be discussed. Photo-induced single electron transfer has been initiated by utilizing the visible-light absorptivity of Eosin Y for a reductive generation of alkyl radicals from N-(acyloxy)phthalimide esters.¹ Depending on the nature of N-(acyloxy)phthalimide esters (primary, secondary, and tertiary carboxylic acid derived) several saturated and unsaturated C-4 alkylated coumarins were synthesized. Both control experiments and photophysical studies supported a radical based mechanism for the selective alkylation. Another cross-coupling of alkylpyridinium salts and coumarins has also been developed. Both primary and secondary alkylpyridinium salts can be used, and high functional group and heterocycle tolerance is observed. Mechanistic studies indicate the formation of an alkyl radical, and controlling its fate was key to the success of this reaction.²



References and Notes:

- 1) Tripathi K. N.; Belal, M.; Singh R. P. *J. Org. Chem.* **2020**,85, 1193.
- 2) Tripathi K. N.; Singh, S.; Singh R. P. *Manuscript Submitted*.

Bio-Sketch of Speaker

Ravi P Singh

Professor

Department of Chemistry
Indian Institute of Technology Delhi

Contact Number: 011 26591502
e-Mail: ravips@chemistry.iitd.ac.in

Homepage: <https://sites.google.com/site/ccsliitdelhi/home>

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Ravi P. Singh born in UP, India, is currently professor in chemistry department at the Indian Institute of Technology (IIT) Delhi, India. He obtained his Bachelor's degree in chemistry from U.P. College, Varanasi and Master's degree from Banaras Hindu University, Varanasi. Later, he moved to the Chemistry Department at IIT Kanpur, to pursue his Doctoral studies under the supervision of Prof. Vinod K. Singh. He gained his postdoctoral experience in U.S.A in the area of total synthesis and asymmetric catalysis. Dr. Singh spent two years (2005-2007) at Harvard University working with Nobel Laureate, Professor E. J. Corey and four years (2007-2011) at Brandeis University working with Professor Li Deng. He started his independent academic career at National Chemical Laboratory - Pune as a Senior Scientist in 2011 and later moved to the chemistry department at IIT-Delhi in 2013. Dr. Singh's research interest is broadly in the field of synthetic organic chemistry and specifically in Asymmetric Catalysis, C-H Activation and total synthesis of small molecules. His research group is not only pursuing various ways to make and break C-C and C-X bonds but also trying to develop strategies to synthesize biologically active and other pharmaceutically relevant natural products in a cost effective way.