

New C(sp²)-B(P) Bonds Formation Triggered by Visible Light

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In the last decade, visible-light photoredox catalysis has emerged as a powerful tool in organic synthesis. In this context, one of the suitable strategies consists of aryl halides to afford the corresponding radical intermediates, which are subsequently trapped by the appropriate nucleophile.¹ This makes this protocol suitable for developing a new and “greener” method that reduce costs and the amounts of heavy metals employed, with milder conditions.

Organoboron compounds are environmentally benign scaffolds that attract considerable interest not only in organic synthesis, but also in other scientific areas of research, such as conjugated materials for organic electronic applications and LEDs manufacturing or antimicrobial agents in medicinal chemistry.² On the other hand, aryl phosphonates are fascinating moieties that present a widespread applicability in scientific fields such as life science, materials or as ligand in catalysis.³ In this context, it appears of great interest to explore the feasibility of new C(sp²)-heteroatom (B, P) bonds formation using visible light as energy source.

Herein, we wish to show our last results on the borylation and phosphorylation of five-membered heteroarene halides (see Figure).⁴ For C(sp²)-B bond formation, a photocatalyst-free protocol has been employed, whereas a photocatalyst-induced reaction has been used to reach the final phosphonates. Interestingly, an easy-to-use gel nanoreactor is involved in both strategies, which has permitted to enhance the production rate and to protect against oxygen poisoning.

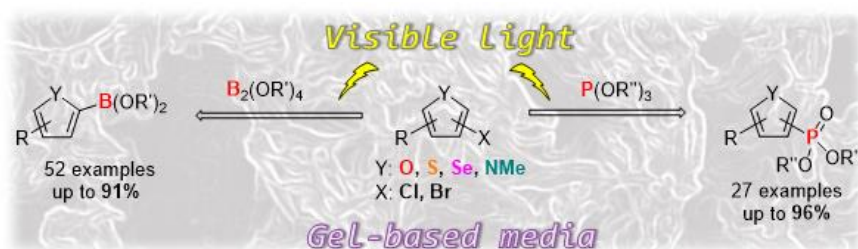


Figure. Borylation and phosphorylation of heteroarene halides by visible light irradiation.

References

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