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Pd-nanoparticle decorated azobenzene based colloidal porous organic polymer for visible and natural sunlight induced Mott-Schottky junction mediated instantaneous Suzuki coupling

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Abstract

We herein report the direct harnessing of visible-to-near-IR light energy by a novel azobenzene-based colloidal porous organic polymer amenable to a post-synthetic loading of metallic Pd nanocrystals for photocatalytic Suzuki and Suzuki-type couplings using in-built Mott-Schottky heterojunction. Upon photo-illumination, the desired products were obtained in a quantitative manner with the highest ever TOF reported till date. Identical catalytic activities were maintained under natural solar irradiance, for bulk-scale reaction and over ten successive recycling of the catalyst. Detailed mechanistic investigations were performed to understand the role of each variable and reactive species involved in the course of the reaction. Inspired by the fast reactivity, a prototypal reaction was pursued in a custom-designed pressure controlled continuous flow setup that instantaneously gave the required product in a quantitative manner.

Keywords

Azobenzene; colloidal porous organic polymer; Mott-Schottky interface; visible and sunlight induced Suzuki; mechanism; continuous flow.

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