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Design, synthesis of 2-mercaptothienopyrimidine linked 1, 2, 3-triazole derivatives and its antioxidant activity

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Synthesis of novel fused heterocycles is an imperative task for heterocyclic chemists from various points of view for the development of compounds of pharmacological and industrial importance. Consequently, the thienopyrimidine ring system constitutes an attractive target for the design of new antioxidant drugs through wide structure variations. This class of compounds has also found wide applications in the design and discovery of novel bioactive molecules and drugs. Recently, thienopyrimidine derivatives play an essential role in several biological processes and have considerable chemical and pharmacological activities. Many of thienopyrimidine derivatives were found to possess a variety of pronounced activities such as antiviral as well as antidiabetic activities. Moreover, some of triazolo thienopyrimidines show significant antifungal and antibacterial activities whereas some exhibited anti-inflammatory and anticancer activities. However, the click chemistry is an excellent approach for regioselective synthesis of 1, 2, 3-triazole ring system in presence of various functional groups. 1, 2, 3-triazole has been extensively studied owing to its importance in industrially interesting materials, such as dyes, anticorrosive agents, photo stabilizers, photographic materials and agrochemicals. Although, 1, 2, 3-triazole compounds showing various biological activities including anti-HIV, anti-bacterial, antiallergic, anticonvulsant, β-lactamase inhibitory and anti-tuberculosis activities. We therefore found it interesting to design new molecules within the scope of synthetic procedure using thienopyrimidine scaffold followed by suitable modification to generate diversified compounds for antioxidant activity. In this study, we oppressed click chemistry for the synthesis of diversified thienopyrimidine derivatives. In view of these observations and in continuation to our work on thienopyrimidine chemistry we synthesized some new compounds containing 1, 2, 3-triazolo thienopyrimidine moieties by copper catalyzed cyclo addition of alkynyl thienopyrimidinone with various substituted aryl azides in the presence of $CuSO_4$ and sodium ascorbate in THF/H_2O (1:1), and tested for their antioxidant activity.

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Study on the interfaces of polymer solar cells

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Polymer solar cells (PSCs) are promising solar energy conversion devices with the advantages of low cost, light weight and room-temperature solution processible. Though the power conversion efficiencies (PCE) of PSCs has been exceeding 11% recently, there are still some fundamental problems concerning the devices interfaces to be solved. In our works, we have been focusing on the working mechanism of water/alcohol soluble conjugating polymer (polyelectrolyte, PFN) interlayer and the D-A interfaces in PSCs. By combining the scanning Kelvin probe microscopy (SKPM) and electron absorption (EA), we visualized a surface potential jump upon the incorporation of the PFN interlayer, and thus proposed a interfacial dipole on the interface, which reinforced the actual built-in potential across the device as a result of the superposition. Simultaneous enhancement in the open-circuit voltage, short-circuit current density and fill factor can be achieved by simply incorporating a thin layer of alcohol/water-soluble polymer as the cathode interlayer. In our recent work , the fundamental losses in VOC of PSCs based on narrow band-gap polymers was studied. And a correlation between the D-A interface phase separation and the band tailing of the device was established. By combining the analysis on the electrical, photocurrent spectral response characteristics, the band tailing and the concomitant increase in the splitting of the electron and hole quasi-Fermi levels were found to be responsible for the VOC.

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