

Ru complex as photovoltaic cell in photoredox catalysis

We show that it is possible to use low-energy NIR light to access the complex synthetic toolbox enabled by photoredox catalysis. This strategy is highly modular, as it is ...

Polynuclear heteroleptic ruthenium(II) photosensitisers combining either imine or amine-functionalised bipyridyl ligands were synthesised (via Schiff-base condensation/reductive amination reactions), characterised and investigated for their photoreactivity in the hydrothiolation reaction. Furthermore, electrochemical, electronic absorption and emission studies of the ...

Photoredox catalysis is a branch of photochemistry that uses single-electron transfer. Photoredox catalysts are generally drawn from three classes of materials: transition-metal complexes, organic dyes, and semiconductors. While organic photoredox catalysts were dominant throughout the 1990s and early 2000s, [1] soluble transition-metal complexes are more commonly used today.

We report an unforeseen reactivity mode for productive photocatalysis that uses cobalt polypyridyl complexes as photocatalysts by exploiting Marcus inverted region behavior ...

Over the last four decades, photoredox catalysis has found widespread application in the fields of water splitting, carbon dioxide reduction, and the development of novel solar cell materials; however, only recently has the potential of applying this catalytic platform to organic synthesis begun to be fully realized. A key factor in the recent yet rapid growth of this ...

This Perspective focuses on the recent developments of Cr(III) complexes as luminophores and dyes for solar cells, their application in photoredox catalysis, their use as sensitizers in ...

The photoredox catalysis is the attractive field not only in environmental application but also in organic synthesis (see Chapter 6.1). As a new asymmetric one-electron mediated transformation, the organocatalysis merging with photoredox catalysis was developed by MacMillan's group. 73-75 Because the enamines, generated from aldehydes and an amine catalyst, act as an ...

In the past decade, synthetic chemists have discovered the outstanding generality and potential of visible-light-driven photoredox catalysis, which converts visible light into chemical energy, realizing numerous transformations of small molecules. The current state-of-the-art strategy in photoredox catalysis, combining photoredox and transition-metal catalysis, has ...

The recent resurgence and dramatic evolution of visible-light photoredox catalysis has led to a paradigm shift in organic synthesis (1-3). The inventive yet intricate design principles, accompanied by practical technological

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developments for ease of implementation, have allowed chemists to activate small molecules, to contrive unconventional modes of bond formation, ...

4. Photoredox catalysis with Cr(III) Shores, Ferreira, and coworkers discovered that under irradiation with visible light, Cr(L₂)₃³⁺ is able to catalyze the [4 + 2] dimerization of 1,3-cyclohexadiene (Fig. 4a) significantly better than the strongly oxidizing Ru(bpz)₃²⁺ complex (bpy ¼ 2,20-bipyrazine).¹⁵ This observation is in line with the ...

Photoredox catalysis is characterized as catalytic organic reactions involving radical intermediates generated by SET (single electron transfer) processes, i.e. 1e⁻ redox processes, which are ...

Over the last four decades, photoredox catalysis has found widespread application in the fields of water splitting, 2 carbon dioxide reduction, 3 and the development of novel solar cell materials; 4 however, only recently has the potential of applying this catalytic platform to organic synthesis begun to be fully realized. A key factor in the ...

The most effective complex in this series, [Ru(bpy)₂(dppz-7-OMe)]⁺, showed IC₅₀ values in the low micromolar range against several types of cancer cells upon light irradiation and, importantly ...

Ru complexes with p-conjugation ligands show two-photon absorption of NIR photons. o. Hybrid MOF-Ru has NIR light-driven photocatalytic performance with recyclability. ...

Isolation of the elusive [Ru(bipy)₃]⁺: a key intermediate in photoredox catalysis+ Samuel J. Horsewill, a Chengyang Cao,^b Noah Dabney,^c Eric S. Yang, ^b Stephen Faulkner ^b and Daniel J. Scott ^{*a} Photoredox catalysis has flourished in recent years, but due to its widespread utility applications have grown faster than mechanistic understanding.

Individually, photoredox catalysis (PC) and photodynamic therapy (PDT) are well-established concepts that have experienced a remarkable resurgence in recent years, leading to significant progress in organic synthesis for PC and clinical approval of anticancer drugs for PDT. ... (III) and Ru(II) Complexes in Photoredox Catalysis and Photodynamic ...

Visible-light-activatable, homogeneous photoredox catalysis has emerged as a useful tool for a range of organic transformations 1,2.The synthetic utility benefits from the ability of catalyts to ...

It is shown that photoredox catalysis can provide an oxygen-independent mechanism of action to combat hypoxic tumours, and offers a new approach for efficient cancer phototherapy. Hypoxic tumours are a major problem for cancer photodynamic therapy. Here, we show that photoredox catalysis can provide an oxygen-independent mechanism of action to ...

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The looming energy crisis and global warming call for an urgent shift to renewable and clean energy usage. 1, 2 Solar radiation, as an inexhaustible natural resource, is a kind of abundant and inexpensive energy input with dramatic ecological benefits. 3, 4 In this context, photoredox catalysis (PRC) has been rising to the forefront of synthetic organic chemistry over ...

Photoredox catalysis has emerged as a powerful tool for organic synthesis, enabling the generation of reac- ... [Ru(bpy) 3] 2+ the excited complex can potentially diffuse in a volume of 1.44 3 10 21 m³ (1.44 3 10⁶ nm³) and encounter potentially 865 ...

field and dye sensitized solar cell (DSSC) literature.[8] By assembling a catalyst in this fashion, we gain the tunability of a molecular catalyst and also the reusability of heterogeneous catalyst to design the ultimate environmentally-friendly photo-redox catalyst. In the photoredox catalysis field, this idea has not been extensively explored.

The FDPP: PdPc system has an upconversion yield of 3.2%, while the fluorescence quantum yields of common photoredox catalysts such as [Ru(bpy) 3] 2+ (bpy, bipyridyl) and Rose Bengal are 9.5% 5 and ...

Shedding Light on the Oxidizing Properties of Spin-Flip Excited States in a Cr(III) Polypyridine Complex and Their Use in Photoredox Catalysis Tobias H. Bürgin, Felix Glaser, and Oliver S. Wenger* Cite This: J. Am. Chem. Soc. 2022, 144, 14181-14194 Read Online ACCESS Metrics & More Article Recommendations * s? Supporting Information ABSTRACT: The ...

Abstract. Some complexes of Cr(III) and Cr(0) have long been known to exhibit interesting photophysical and photochemical properties, but in the past few years important conceptual progress was made. This Perspective focuses on the recent developments of Cr(III) complexes as luminophores and dyes for solar cells, their application in photoredox catalysis, their use as ...

Photoredox catalysts are usually transition metal complexes containing heavy metal atoms such as Ru and Ir, and they have been used for several decades for initiating electron transfer reactions. ... (enone) 12.7 using the photoredox catalyst Ru(bpy) 3 Cl 2 with i-Pr 2 NEt and LiBF 4 as additives is shown in Fig. 12.8 A. 21 The reaction gives ...

In cancer cells, complex 1 localizes in mitochondria and disrupts electron transport via NADH photocatalysis. On light irradiation, complex 1 induces NADH depletion, intracellular redox imbalance and immunogenic apoptotic cancer cell death. ... ru. Article search Organizations ... Huang, Huaiyi, et al. "Targeted photoredox catalysis in cancer ...

Moreover, ruthenium polypyridyl complexes, such as [Ru(bpy) 3] 2+ and [Ru(tpy) 2] 2+, are well established in the domain of visible photoredox catalysis for their broad absorption ...



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In this review, we will describe recent developments of radical reactions involving various carbon-centered radicals through photoredox processes mediated by Ru- and Ir-based photocatalysts.

Photoredox Catalysis in Organic Chemistry Megan H. Shaw, Jack Twilton, and David W. C. MacMillan* Merck Center for Catalysis at Princeton University, Princeton, New Jersey 08544, United States ABSTRACT: In recent years, photoredox catalysis has come to the forefront in organic chemistry as a powerful strategy for the activation of small molecules.

Visible-light-mediated photoredox catalysis has evolved as an efficient and mild alternative to conventional organic synthesis. Inspired by the elegance and sophistication of natural ...

In photoredox catalysis, transition metal complexes, organic dyes, or semiconductors absorb photons to reach an electronic excited state. ... the solar cell community has adopted clear standards that are broadly followed in both academia and industry. 40, 41 It has been argued that a similar philosophy should be adopted when evaluating the ...

Visible-light photoredox catalysis has become a practical tool in the last years for driving energy-demanding chemical reactions. Owing to their exceptional photoelectrochemical properties, classical octahedral ruthenium and iridium complexes still dominate the field of photoredox catalysis despite their drawbacks, such as sustainability and costs.

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