

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 ...

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. Bannin, 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 ...

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 ...

Photoredox catalysis has emerged as a powerful tool for organic synthesis, enabling the generation of reactive intermediates under mild reaction conditions. In this review, ...

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 ...

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 ...

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 ...

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 catalysts to ...

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 ...

## Ru complex as photovoltaic cell in photoredox catalysis

Preliminary photoredox catalytic studies used the substrates thiophenol and styrene as coupling partners in the presence of the prototypical  $[\text{Ru}(\text{bpy})_3](\text{PF}_6)_2$  complex ...

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 ...

Heterogenized photoredox catalysts provide a path for sustainable chemical synthesis using highly tunable, reusable constructs. Here, heterogenized iridium complexes as photoredox catalysts were assembled via covalent attachment to metal oxide surfaces ( $\text{ITO}$ ,  $\text{ZrO}_2$ ,  $\text{Al}_2\text{O}_3$ ) in thin film or nanopowder constructs. The goal was to understand which materials ...

Photocatalysis is widely used in numerous fields, including chemistry and biology. This Review highlights the impact of photosensitization and photoredox photocatalysis within therapeutic ...

It is notable that most reported photoredox catalysis has been carried out in degassed organic solvents<sup>26</sup>. An oxygen-independent MOA is appealing for NADH photo-catalysis in hypoxic cancer cells. However, strong triplet excited-state quenching by water and oxygen severely limits the application of traditional photo-catalysts in biological ...

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 ...

The most effective complex in this series,  $[\text{Ru}(\text{bpy})_2(\text{dppz-7-OMe})]^{2+}$ , showed  $\text{IC}_{50}$  values in the low micromolar range against several types of cancer cells upon light irradiation and, importantly ...

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 ...

Moreover, ruthenium polypyridyl complexes, such as  $[\text{Ru}(\text{bpy})_3]^{2+}$  and  $[\text{Ru}(\text{tpy})_2]^{2+}$ , are well established in the domain of visible photoredox catalysis for their broad absorption ...

Photoredox catalysts are usually transition metal complexes containing heavy metal atoms such Ru and Ir, and they have been used for several decades for initiating electron transfer reactions. ... (enone) 12.7 using the photoredox catalyst  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2$  with  $i\text{-Pr}_2\text{NEt}$  and  $\text{LiBF}_4$  as additives is shown in Fig. 12.8 A. 21 The reaction gives ...

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.

**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 ...

Moreover, a Ru(III) centre and an anthraquinone anion centre may be generated upon irradiation, which can further oxidize NADH/NADPH and generate  $O_2^{\cdot-}$ , successfully eliciting photoredox catalysis ...

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 ...

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

Photoredox catalysis has emerged as a powerful tool for organic synthesis, enabling the generation of reac- ... [Ru(bpy)<sub>3</sub>]<sup>2+</sup> the excited complex can potentially diffuse in a volume of 1.44 × 10<sup>21</sup> m<sup>3</sup> (1.44 × 10<sup>6</sup> nm<sup>3</sup>) and encounter potentially 865 ...

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.

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. ...

After a decade of growth, photoredox catalysis is still developing, with many researchers now focused the use of novel photosensitizers to catalyze photochemical reactions in visible light.

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 ...

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.

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