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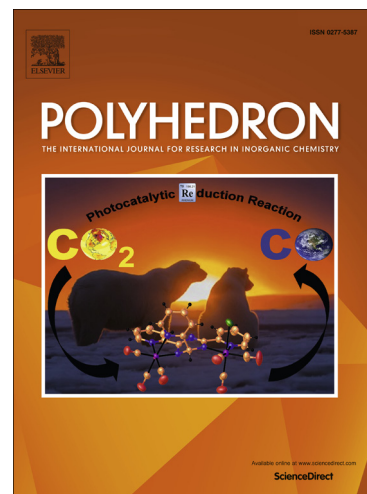
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# Redox cycling of iridium(III) complexes gives versatile materials for photonics applications

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## Abstract

The cyclometallated iridium(III) complex  $[\text{Me}_4\text{N}][\text{Ir}(\text{ppy})_2(\text{cat})]$  (Hppy = 2-phenylpyridine;  $\text{H}_2\text{cat}$  = benzene-1,2-diol) has been prepared under inert atmosphere and structurally characterized by single crystal X-ray diffraction. Under ambient conditions, the fully reduced complex (as formulated) undergoes rapid one-electron oxidation both in solution and in the solid state to a species containing a semiquinone ligand. The resultant neutral complex  $[\text{Ir}(\text{ppy})_2(\text{sq})]$  (sq = *o*-semiquinone) was also prepared by exposing the reaction mixture to  $\text{O}_2$  during the course of the reaction. Electron paramagnetic resonance (EPR) spectroscopy confirms the diamagnetic nature of the complex  $[\text{Me}_4\text{N}][\text{Ir}(\text{ppy})_2(\text{cat})]$  and indicates that the unpaired electron in  $[\text{Ir}(\text{ppy})_2(\text{sq})]$  resides primarily on the sq ligand. The photophysical, electrochemical, and spectroelectrochemical properties of  $[\text{Ir}(\text{ppy})_2(\text{sq})]$  were investigated and reveal the changes in absorption as the complex is converted into the catecholate and quinone forms.

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**Keywords:** iridium; semiquinone; spectroelectrochemistry; X-ray structure

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