Tracing the photo-driven electron transfer efficiency between octahedral molybdenum halide cluster $[Mo_6I_8Cl_6]^{2-}$ and different polyoxometalates

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The quest for photochemical energy storage has enabled appreciable interest in the study of electron transfer properties in transition metal complexes. The long-lived triplet state of coordination complexes enables efficient electron transfer making them promising for solar energy storage.[1,2] In particular, octahedral metal halide clusters represent a class of electron rich species known for their intense luminescence and considerably long-lived triplet state.[3] On the other side, polyoxometalates (POMs) correspond to molecular 'electron reservoir" built from group VI transition-metal centers in their highest oxidation state (Mo^{VI} and W^{VI}) assembled together with oxygen atoms within a wide variety of structures and compositions .[4] Incorporating the advantage of their complementary properties present an attractive way to further the electron transfer studies on these all-inorganic chemical systems.

In our work, photophysical characterization (steady state and nanosecond scale time-resolved spectroscopy) of the molybdenum halide cluster $[Mo_6I_8Cl_6]^{2-}$; acting as photosensitizer in combination with different POMs: $[PW_{12}O_{40}]^{3-}$, $[PW_{11}VO_{40}]^{4-}$, $[P_2W_{18}O_{62}]^{6-}$ and $(BW_{12}0_{40})^{5-}$; acting as catalytic platform has been presented. The work highlights a novel study on the photoinduced electron transfer process between the two entities (Figure) and explores the dependence of electron transfer efficiency on the charge density of the metal atom of the POM, leading up to exploring their potential in clean energy production.

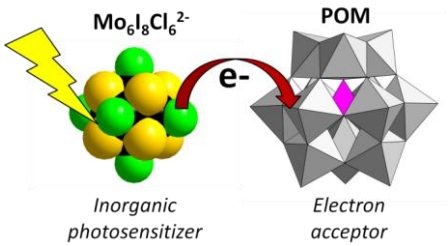

Figure: Photo-induced electron transfer from $[Mo_6I_8Cl_6]^{2-}$ to polyoxometalate

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