

Deliberate Functionalization and the Consequential Electronic Relaxation Pathways of the Pyrimidine Chromophore

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C4 functionalization facilitates ultrafast IC to the ground state and frustrates access to the $^1n\pi^*$ and ISC to the reactive triplet states.

C2 and **C4** functionality leads to tunability of emissive and ISC decay pathways; Thereby aiding in the development of emissive biomarkers, photo-crosslinkers, and photodynamic therapy agents.

Plausible that prebiotic RNA/DNA ancestor determination based on catalytic photoreactivity or selective photostability, meeting the needs of chemical evolution.

