

# SYNTHESIS OF PHENOTHIAZINE DERIVATIVES EXHIBITING VERY LONG ROOM TEMPERATURE PHOSPHORESCENCE

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Room-temperature phosphorescence (RTP) in organic compounds is an uncommon yet highly intriguing phenomenon with significant applications in various fields, including bioimaging<sup>1,2</sup>, data encryption<sup>1,2</sup>, and digital displays<sup>1,2</sup>. However, inducing phosphorescence in organic compounds presents considerable challenges, often necessitating cryogenic temperatures and an inert atmosphere<sup>1</sup>. In this study, we have developed a series of S,S-dioxophenothiazine derivatives capable of exhibiting long-lasting RTP. Through systematic structural modifications, we aim to elucidate the correlation between molecular architecture and phosphorescent properties, ultimately advancing the design of organic compounds that demonstrate stable and prolonged phosphorescence under ambient conditions, with observed lifetimes reaching up to 700 milliseconds. The synthesized crystalline structures were characterized using X-ray diffraction, while fluorescence spectrophotometry was employed to measure the phosphorescence lifetimes of each compound. These findings contribute to the growing class of fully organic phosphorescent materials with extensive application potential. S,S-dioxophenothiazine serves as a versatile molecular scaffold, offering high tunability and synthetic accessibility—both of which are crucial attributes in the development of phosphorescent materials. While this research is ongoing, it provides valuable insights for the future advancement of organic phosphorescent systems.

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[1] 1. Kenry, Chen, C. & Liu, B. Enhancing the performance of pure organic room-temperature phosphorescent luminophores. *Nat. Commun.* 10, 2111 (2019).

[2] Wright, I. A., Etherington, M. K., Batsanov, A. S., Monkman, A. P. & Bryce, M. R. Oxidation State Tuning of Room Temperature Phosphorescence and Delayed Fluorescence in Phenothiazine and Phenothiazine-5,5-dioxide Dimers. *Chem. – Eur. J.* 29, e202300428 (2023).