

Investigation of the Superoxide Anion Sensing Potential of Brominated Coelenterazine Analogs

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Superoxide anion is a reactive oxygen species (ROS) of biological interest, as it plays a role in both intra- and intercellular signaling.^[1] Superoxide anion is also associated with conditions such as inflammation and cancer. Given this, the research community has given attention to the development of new sensing methods for the selective and sensitive determination of this ROS species.^[1]

Among these approaches, chemiluminescence (CL) has been showing great potential. CL is an interesting process in which light is emitted due to a chemical reaction, without the need for photoexcitation, which leads to high signal-to-noise.^[2] Among different CL systems, that of marine Coelenterazine has been attracting attention as a superoxide anion probe, as its CL reaction can be triggered solely by this ROS species.^[1] However, its light-emission intensity is typically reduced in aqueous media,^[3] which can prevent its use as a ROS probe.

Our team has studied the Coelenterazine system and in recent years has discovered that the bromination of its scaffold can provide this system with new and enhanced properties, such as anticancer activity.^[2] More relevantly, the introduction of bromine heteroatoms can also lead to enhanced CL emission in an aqueous solution, when triggered by a superoxide anion, which allows this system to be used as a dynamic and sensitive superoxide anion probe.^[4-6]

Herein, in this study, we investigate the CL reaction of different brominated Coelenterazine analogs using luminometry and UV-Vis and fluorescence spectroscopy. Our aim is the determination of relevant structure-activity relationships regarding the superoxide anion-induced CL emission by these compounds, as well as to understand the reason behind their enhanced emission. These results should help to guide future developments of Coelenterazine-based compounds as CL probes for superoxide anion.

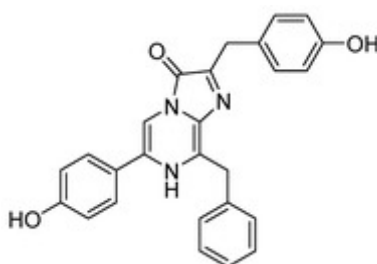


Figure 1. Molecular structure of native Coelenterazine.

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