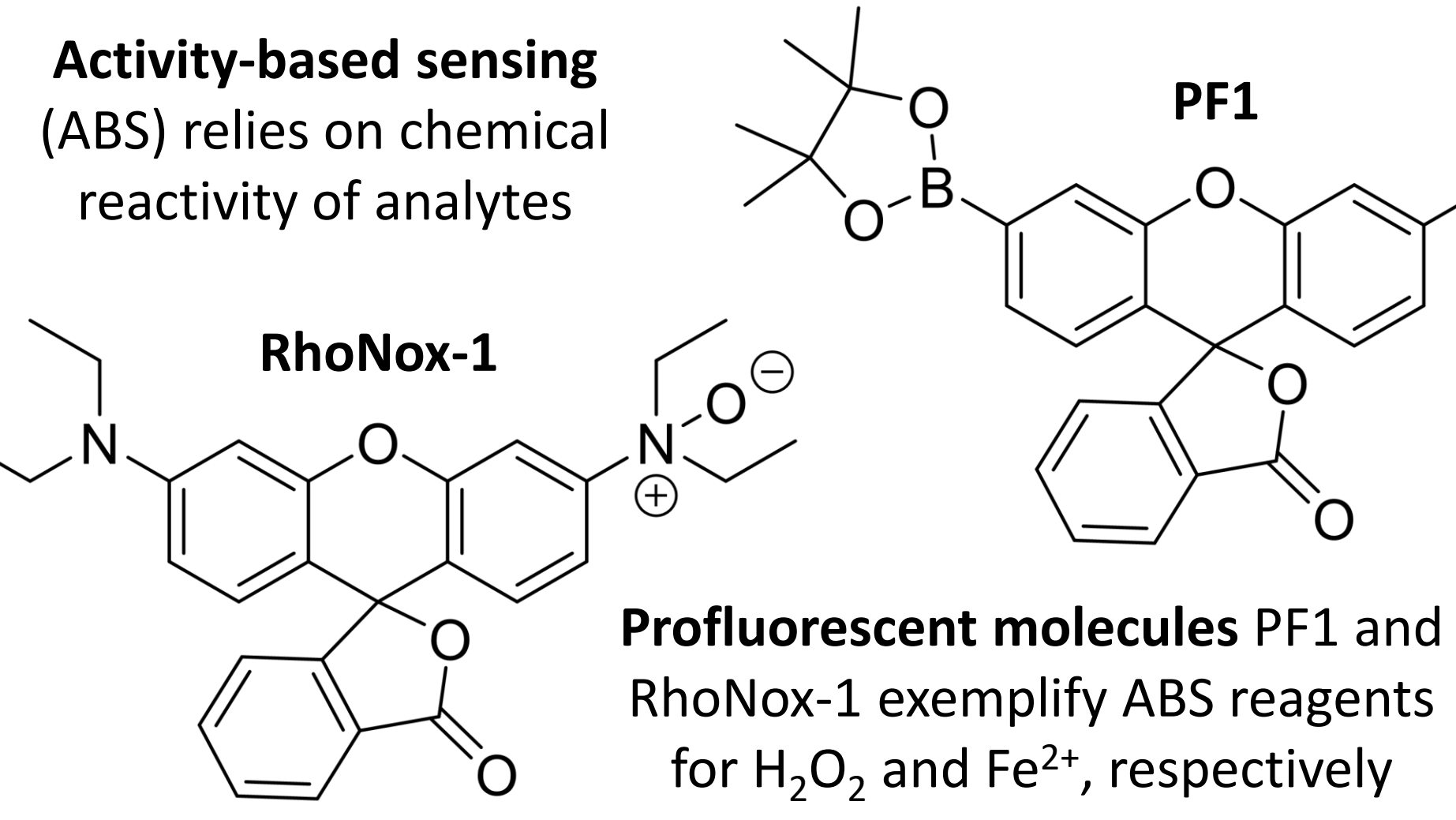
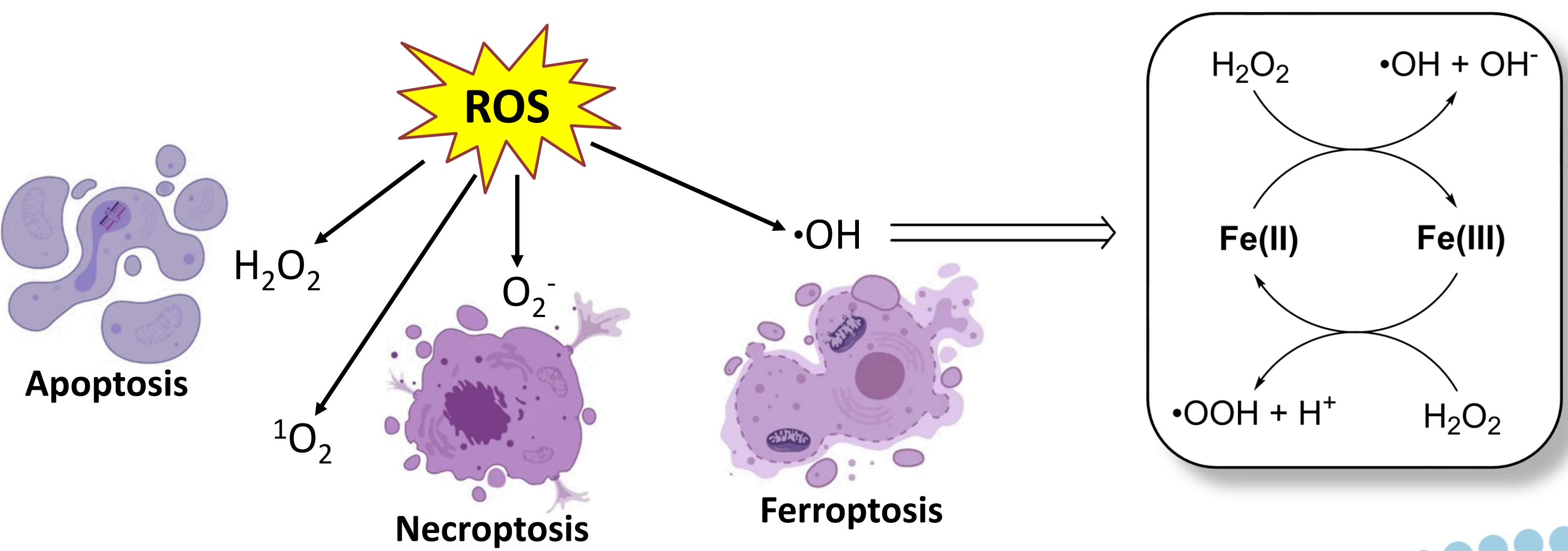
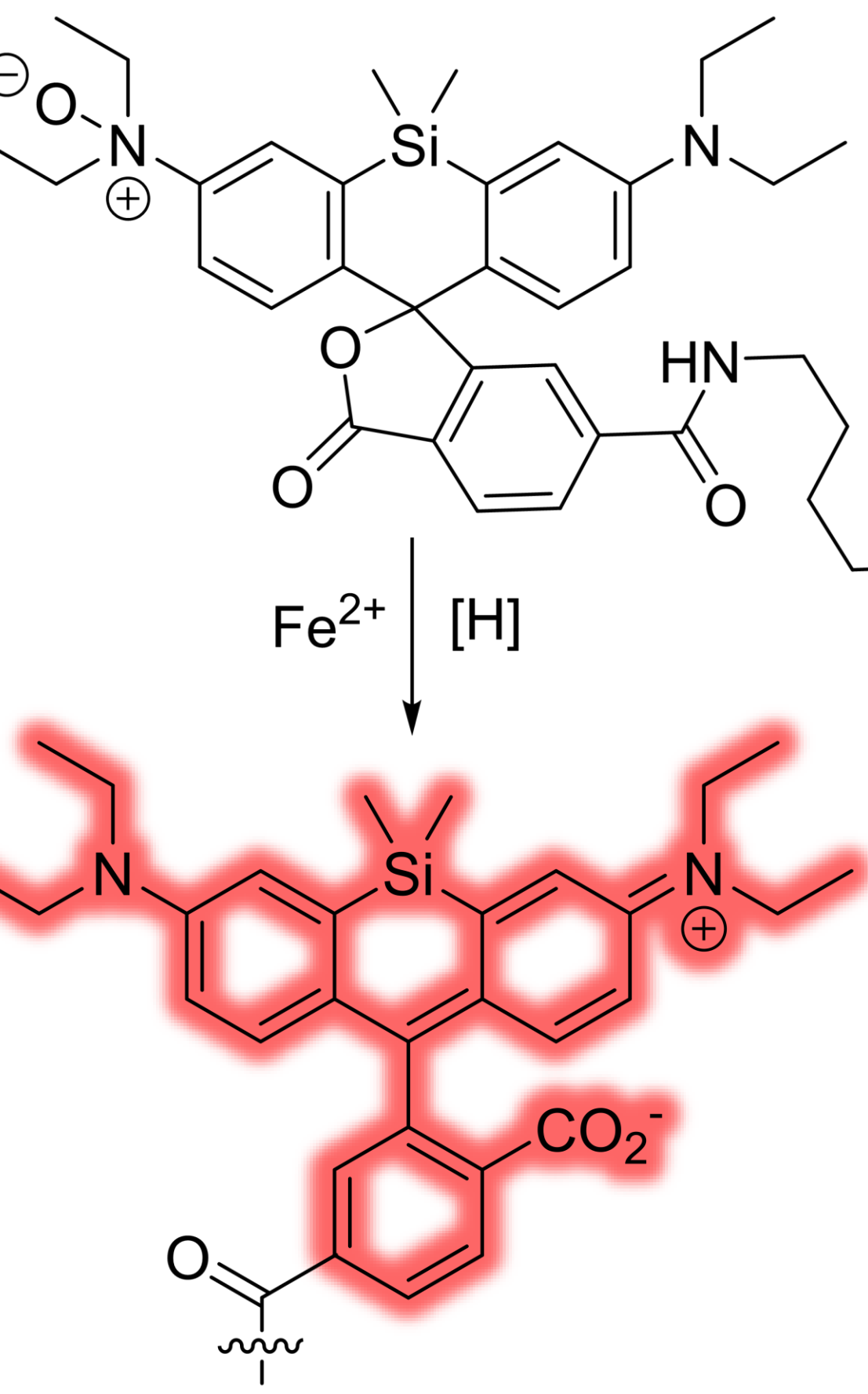


Lipid membranes are often overlooked as some of the most important components of life that enable compartmentalization but also support the complex biochemical processes required for cellular operations. The structure of a membrane is closely tied to its function, and changes in structure are associated with the action of **reactive oxygen species (ROS)** during **regulated cell death (RCD)**. By developing tools that visualize membranes and harness activity-based sensing technology, we seek to improve our understanding of RCD and define the critical roles of membranes in life and death.

RCD occurs through several pathways that are characterized by distinct membrane morphologies. RCD is associated with ROS known to signal, modulate, and in some cases drive cell death.

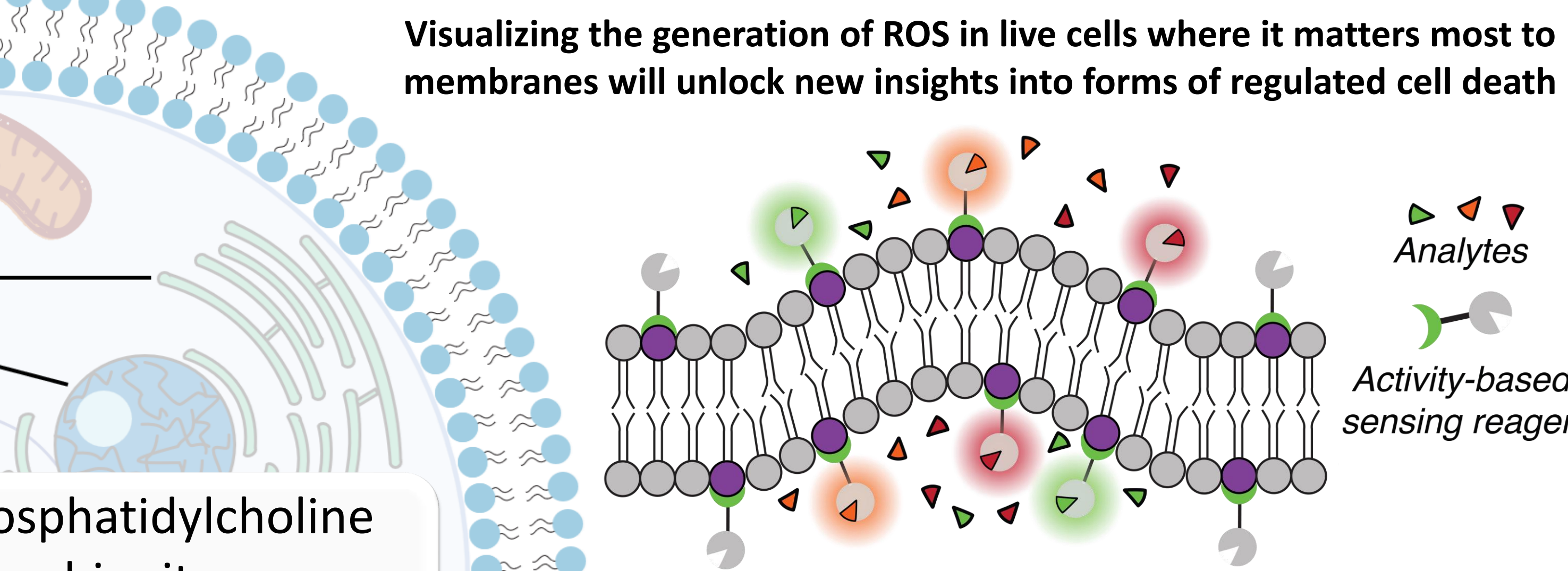
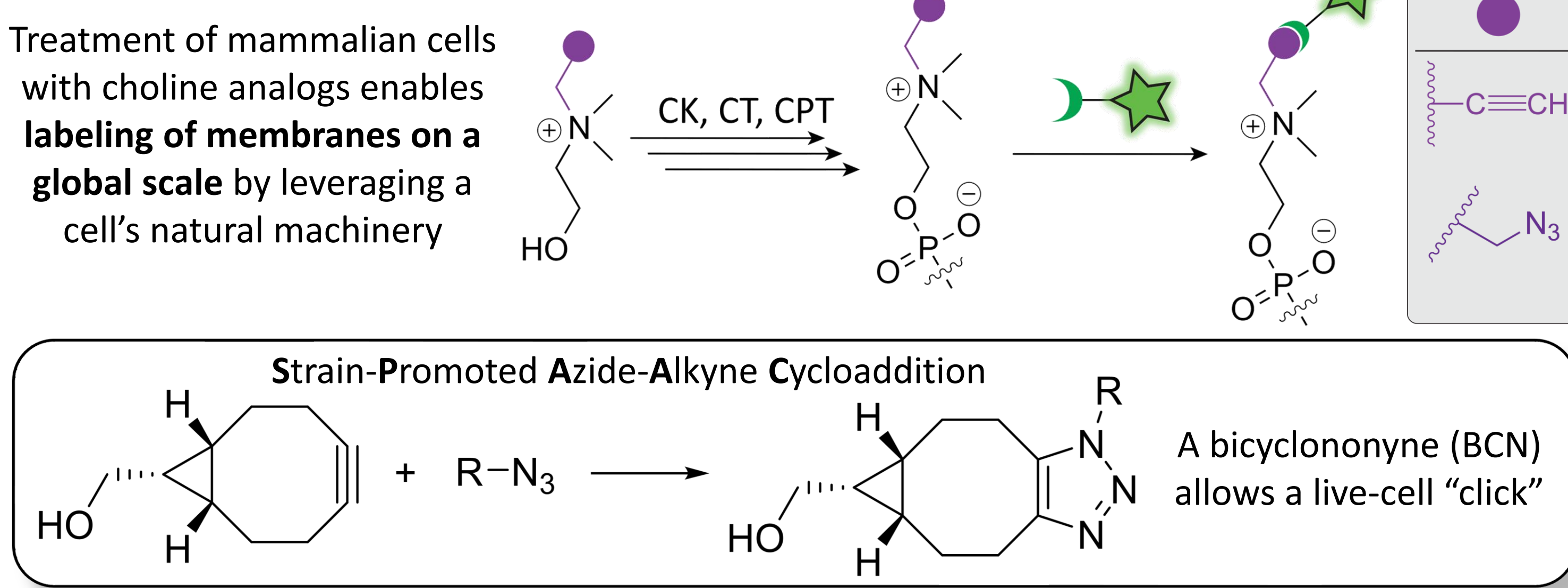
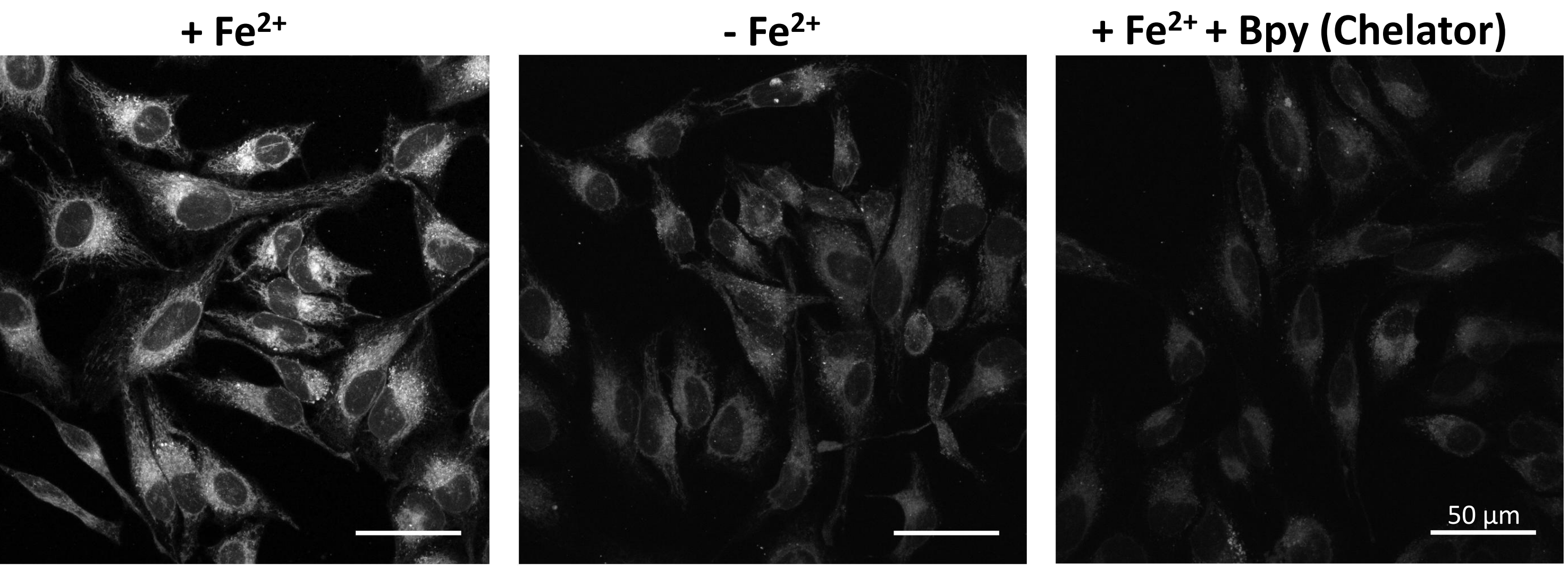


Ferrous Iron Sensor

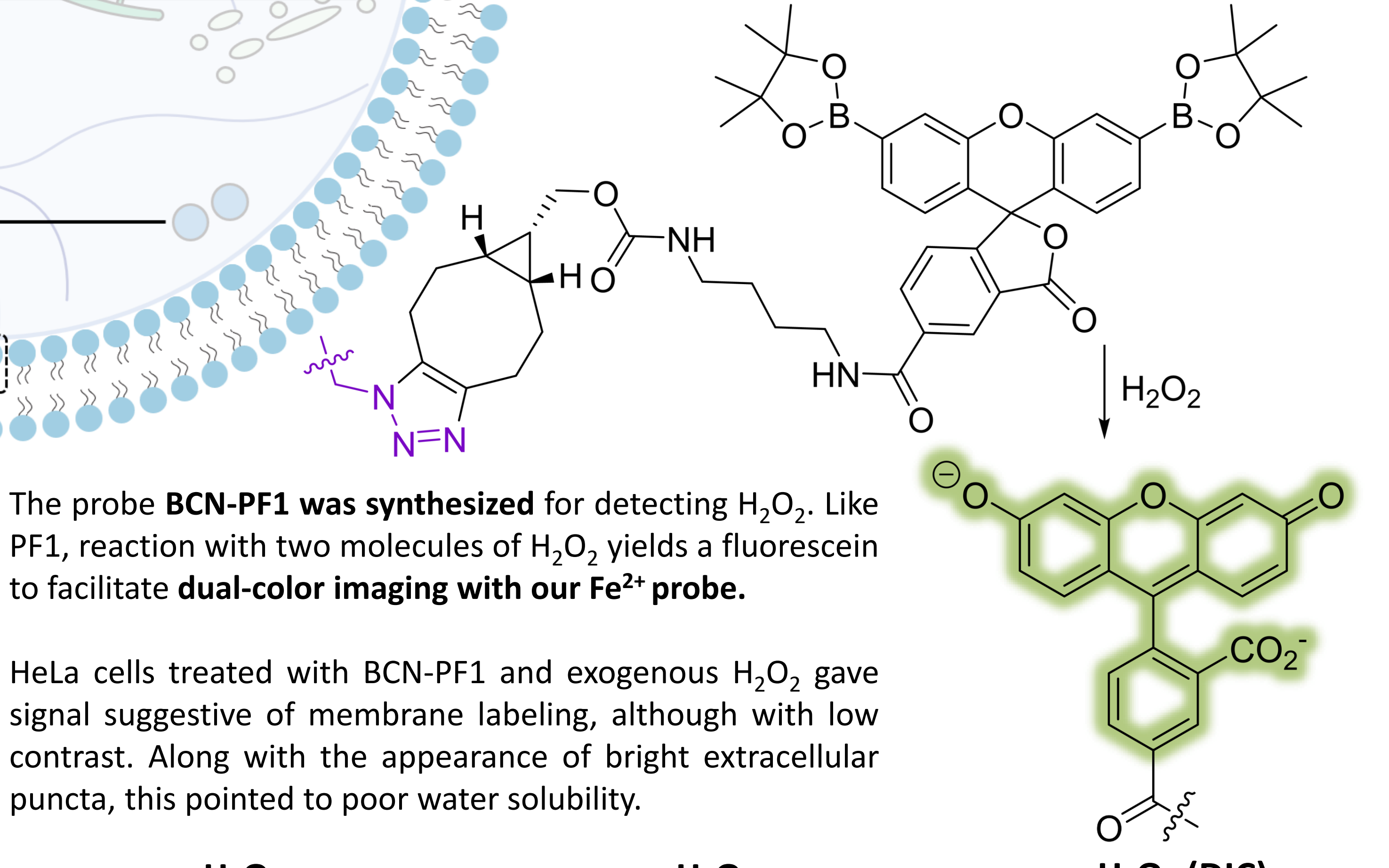


The probe **BCN-SiRhoNox-1** was synthesized for detecting Fe²⁺. Compared to RhoNox-1, this sensor has a silicon substituted for oxygen to shift **fluorescence to deep red**.

HeLa cells treated with BCN-SiRhoNox-1 gave fluorescent signal suggestive of membrane labeling, which increased after Fe²⁺ supplementation. Co-treatment with chelator reduced signal, indicative of sensitivity to basal Fe²⁺.

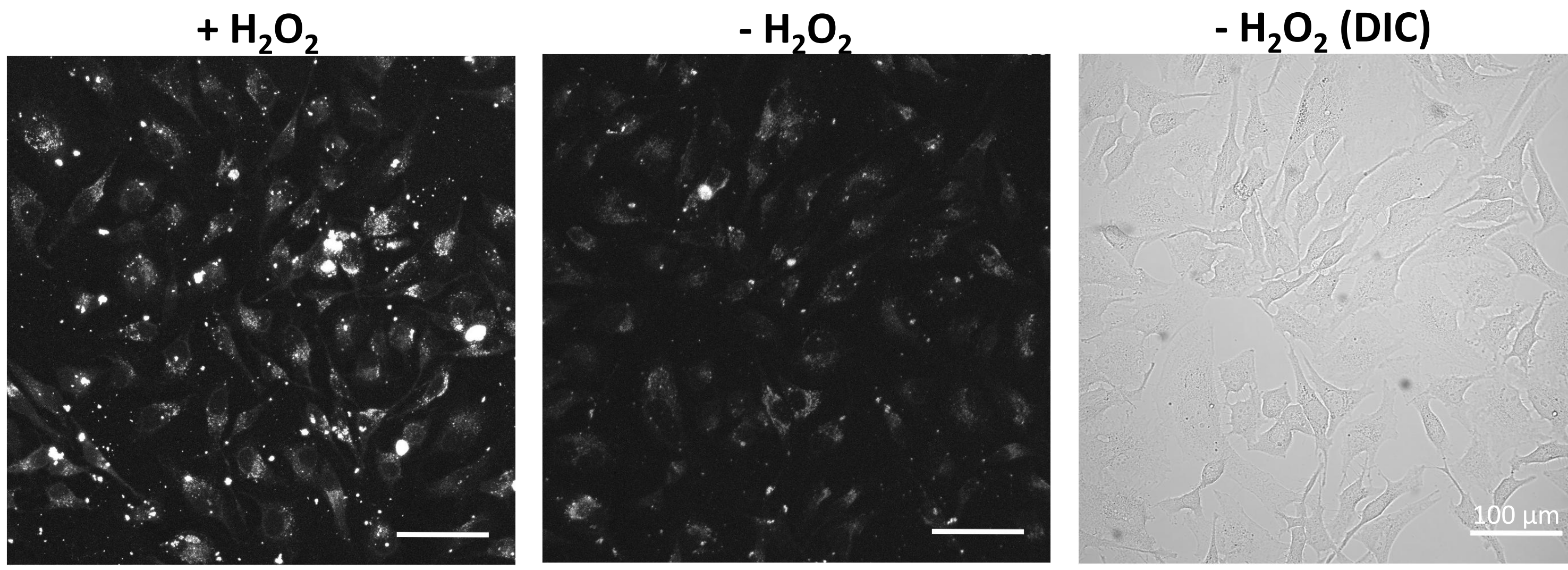


Peroxide Sensor

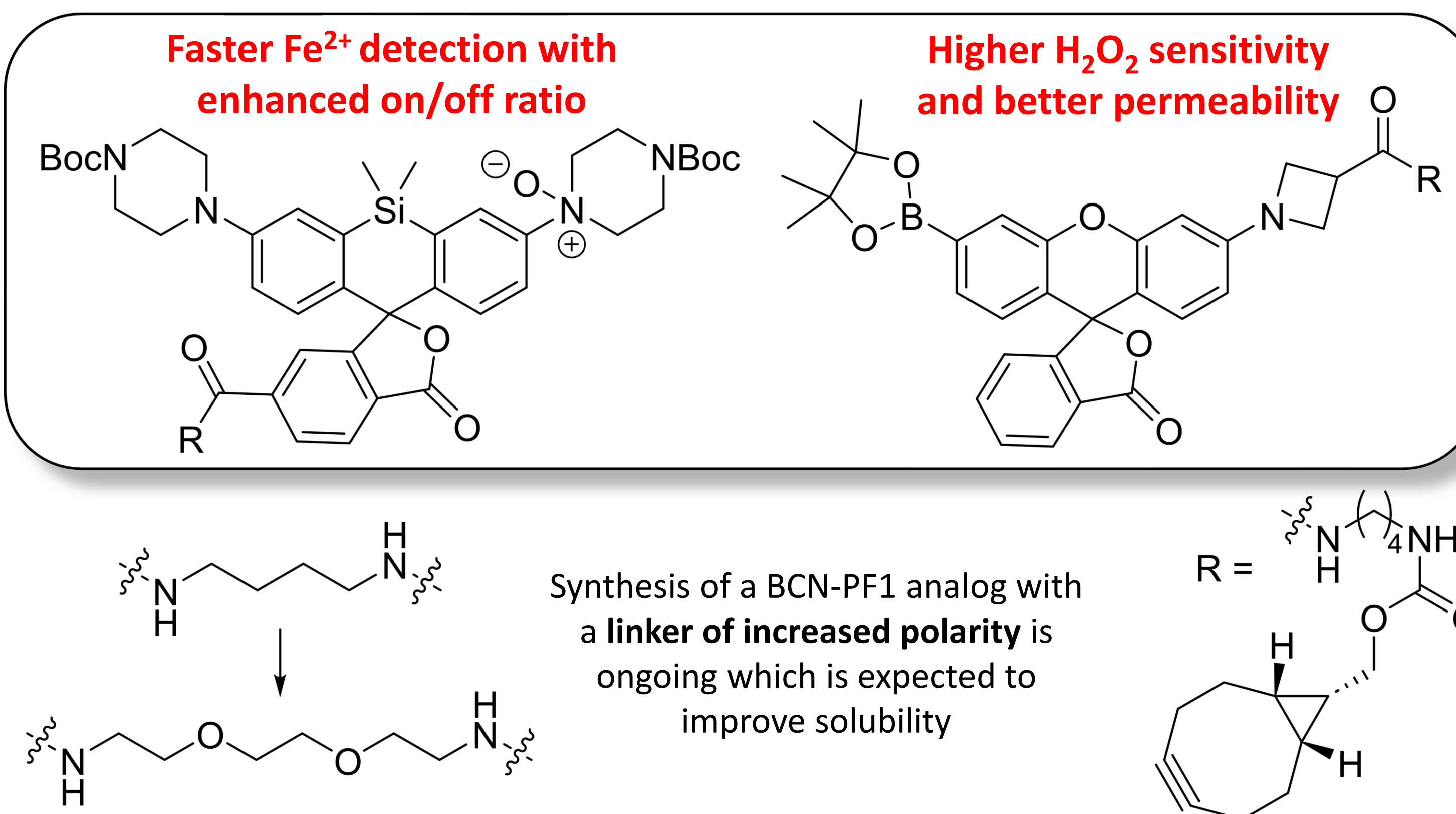
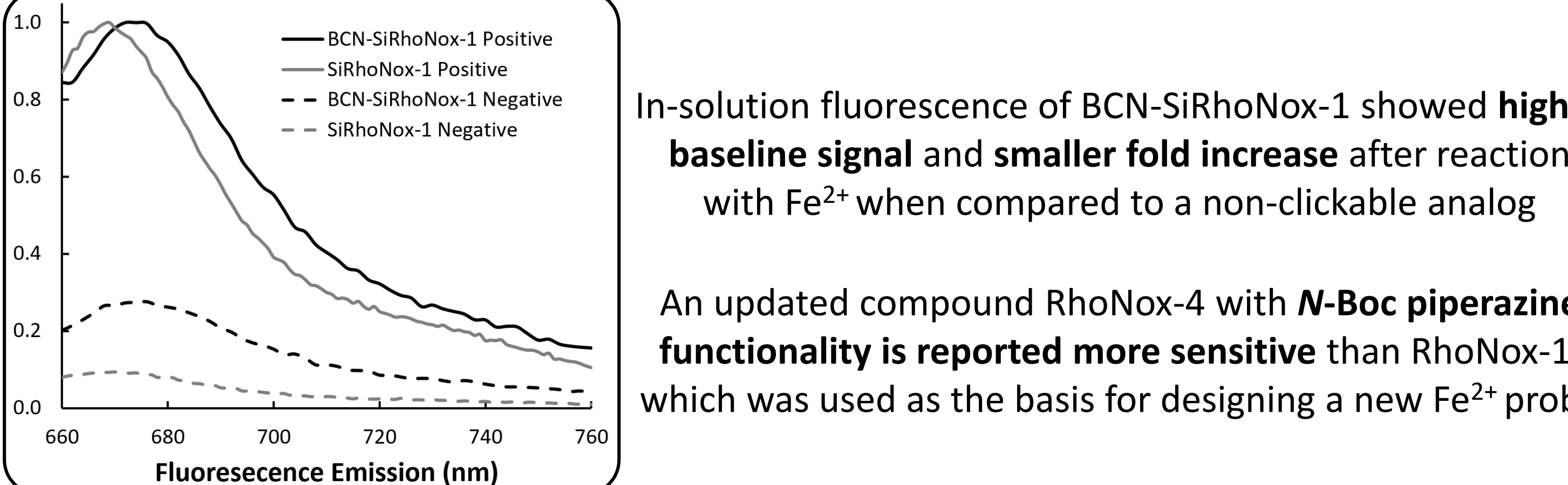


The probe **BCN-PF1** was synthesized for detecting H₂O₂. Like PF1, reaction with two molecules of H₂O₂ yields a fluorescein to facilitate **dual-color imaging with our Fe²⁺ probe**.

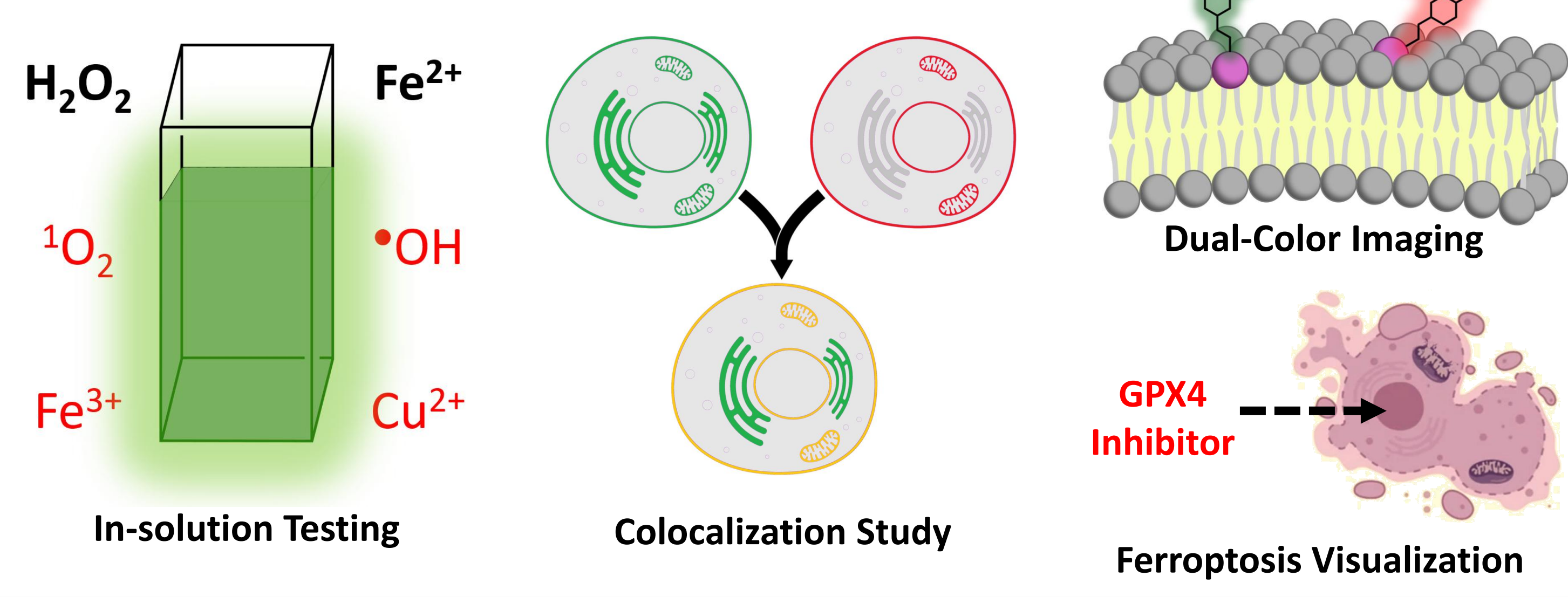
HeLa cells treated with BCN-PF1 and exogenous H₂O₂ gave signal suggestive of membrane labeling, although with low contrast. Along with the appearance of bright extracellular puncta, this pointed to poor water solubility.



Improvements & Next-Gen ABS Probes



Continuing Work



References

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Acknowledgements

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