Utilizing selenide and chalcogenides in well defined molecular probes to detect components of oxidative stress (ROS) and biothiols

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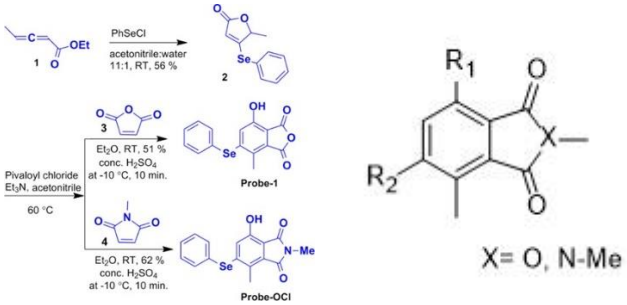
Hypochlorous (OCl^-) ion is the most well-known bacterial oxidant to be produced by neutrophils. Excess amounts of OCl^- can cause various disorders in living systems. Both probes show immediate "turn-on" fluorescence upon the addition of OCl^-; the chemical oxidation of the phenylselenyl position to give the Ar-Se(O)-Ar group is the simple and controllable driver for the optical changes.

We found that mycophenolic acid core intermediates through our research can be used as a new fluorophore class. Mycophenolic acid was discovered by Gosio in 1893 in a strain of *Penicillium fungus*; it is recognized as one of the oldest known antibiotics. Mycophenolic acid was found to possess broad biological activity such as antiviral, antifungal, antibacterial, anticancer, and antipsoriasis properties.

Among other research accomplishments, herein, we have designed, synthesized, and characterized novel organoselenium-based molecules (**Probe-1 and Probe-OCl**) based on a synthetic intermediate of mycophenolic acid (MPA) for the aqueous detection of OCl^-. We are derivatizing the molecule further to expand the practicality of this fluorophore class. This product contain the keto-enol position, similar with *acac* (acetylacetone). Therefore, we can use these derivatives for specific metal detecting probe and use for chelate ligand. We have already screened the molecules for iron and zinc ion detection.

We are interested in (i) determining the role of ROS in diseases such as dementia and other neurological disorders, (ii) to probe the workings of the immune system and also (iii) to better understand the process of biological aging. Also, the change of "anhydride" to "methylamide" affords Probe-OCl more stability without sacrificing the molecules water solubilization.



Reference: Halle, M.B.; Yudhistira, T.; Lee, KJ.; Choi, JH.; Kim, Y,; Park, HS.; Churchill, D.G.; *ACS Omega*. **2018** Oct 31;3(10):13474-13483