

Title – The Development of a Fluorescent Calcium Indicator

Program of Study – Chemistry

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Abstract: Calcium can be used in a wide variety of applications and is found in both natural and man-made materials. One of its best known applications is its role in the body. Calcium is important not only for skeletal structure, but for cell signaling, muscle contraction, and nerve function, all of which makes calcium an irreplaceable part of the human body. Because of the importance of calcium, there is a need to be able to image it and track it in the body.

Fluorescence is a common way to track ions in the body and has been used for not only calcium, but other ions important in the body, such as magnesium or zinc. While there are successful calcium indicators already in existence, our goal in this project is to develop another indicator that will add to the compounds to choose from depending on the specific application.

We had identified an aromatic diacid as a potential fluorescent calcium indicator and have undertaken the task of characterizing how it binds to calcium. The diacid does bind to calcium, however, it becomes insoluble in water, and thus will not be a good indicator for use in biomedical applications that require a water-soluble product. In addition, while the diacid is fluorescent, the Ca-product is not. We are currently characterizing how the molecule is binding to the calcium through gravimetric analysis, titrations, and atomic absorption in order to learn more about what exactly is happening on the molecular level. Future work may consist of increasing water-solubility.