Synthesis of an Unnatural Fluorescent Amino Acid

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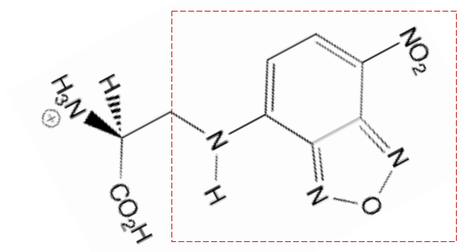
Abstract

The long-term goal of this project is to chemically synthesize an unnatural fluorescent amino acid (UFAA) that can later be used to build glow-in-the-dark proteins. UFAAs allow investigators to visualize a single protein in an otherwise transparent living cell. The specific UFAA target for this project is L-alanine, 3-[7-nitro-2,1,3-benzoxadiazol-4-yl], which is an analog of the natural amino acid tryptophan. This synthesis consists of a coupling reaction followed by a deprotection reaction. Products have been characterized using ^{1}H and ^{13}C NMR, and Liquid Chromatography-Mass Spectrometry (LC-MS). Future tasks could include optimizing the yield and purity of this UFAA.

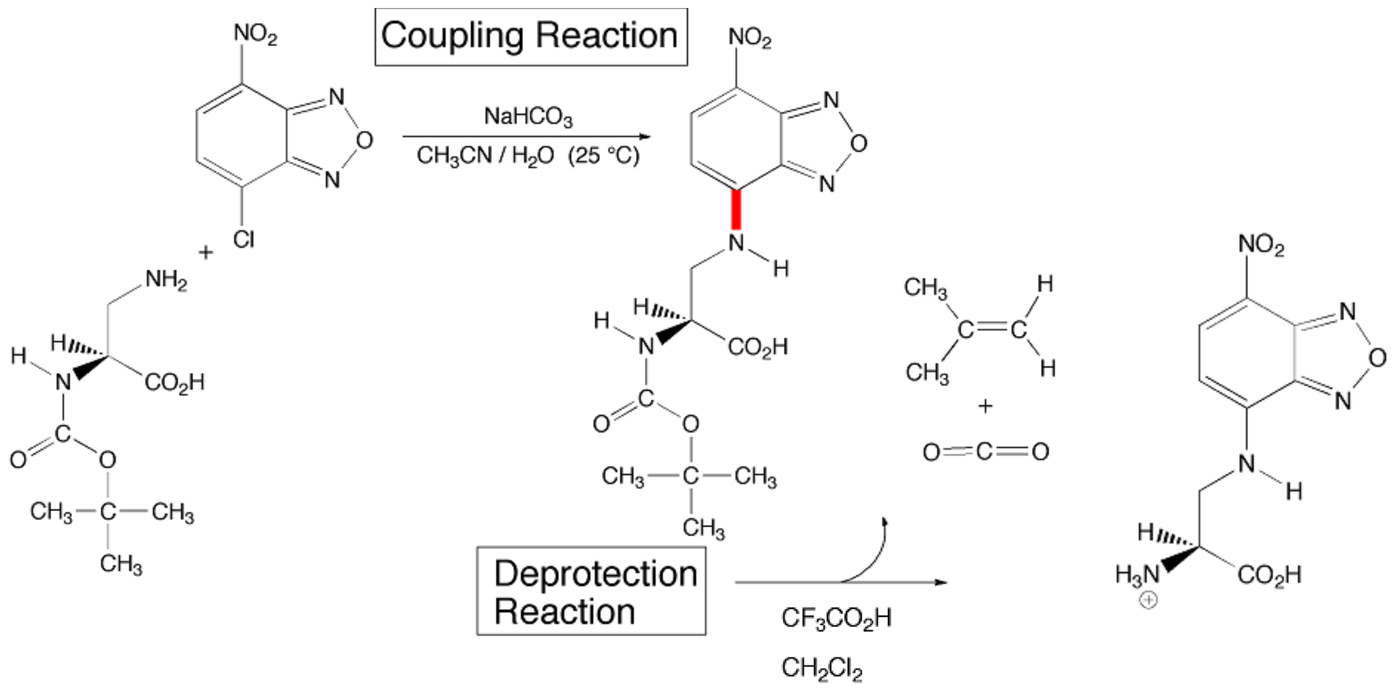
Introduction

- Current methods of visualizing proteins such as Green Fluorescent Proteins (GFP) pose problems because they are very bulky and cannot be used in vivo (in a living cell)
- Each amino acid has a unique R group
- The goal of the project is to synthesis a fluorescent R group, which can be used to create a glow-in-the-dark-protein



Fluorescent R group

Synthesis



Results

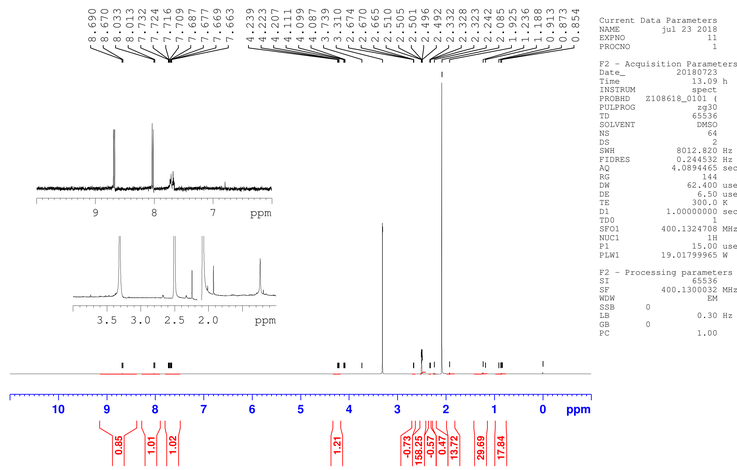


Fig. 1 ^{1}H NMR of coupling reaction

Future Work

- Improve purity and percent yield
- Use screening system (Scripps Institute) to determine whether or not this incorporated into proteins using existing tRNA synthetases

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