

Bioluminescence and the Determination of the Color Emission Mechanism

POSITION TITLE: Protein Biochemist

RESEARCH PROJECT TITLE: Bioluminescence and the Determination of the Color Emission Mechanism

FACULTY NAME & TITLE: WAEL RABEH, PH.D., ASSISTANT PROFESSOR OF PRACTICE OF CHEMISTRY

RESEARCH PROJECT DESCRIPTION

Bioluminescence is found in various living organisms including bacteria, fireflies, beetles, marine organisms, and others. Luminous organisms produce light from an enzymatic reaction that involves the enzyme luciferase and its substrates luciferin and ATP in their ground state to produce a high-energy product in excited state that decays back to the ground state and release energy as a photon of visible light. Luciferase assays are used in biological and medical research, which currently represents the main analytical platform in the *in vivo* imaging, cell proliferation, and protein folding and secretion. Investigating the kinetic and emission color mechanisms of the luciferase reaction will improve and diversify some of the existing assays and develop new applications.

In this project, we would like to study the structural and mechanistic properties of two different enzymes that produce red and green luminescence. The substrates of the two enzymes are identical, however, different luminescence color is produced as a result of different enzymes' structures. To characterize the color difference between the two enzymes, we will express and purify the protein in bacterial expression system. The protein will be characterized using different spectral techniques, X-ray crystallography, and enzyme kinetics.

RESPONSIBILITIES OF THE POSITION

- Molecular Biology: DNA cloning and manipulation.
- Express and purify proteins using *E.coli* expression system.
- Protein X-ray crystallography and three-dimensional structural determination.
- Enzyme kinetics

ESSENTIAL QUALIFICATIONS:

Biology or Chemistry degree

PREFERRED EXPERIENCE / SKILLS:

Prior experience in wet lab with good technical and safety skills.

APPLICANTS TO PROVIDE:

1. Statement of interest in the position
2. Transcript of degree(s)
3. CV
4. Two letters of recommendation