



Prof. Katrina Forest

UW Madison

Bacteriology & Biophysics

Analytical Seminar

Thursday, Nov. 13th at 12:15 p.m.

Room 1315 Chemistry

“Colorless green ideas sleep furiously: Structure/function studies on a bacterial photoreceptor”

Phytochrome is a multidomain red-light photoreceptor that allows cells to respond to the quality and intensity of incoming light. Bacterial phytochromes adopt a deep figure-of-eight knotted polypeptide. They bind the linear tetrapyrrole biliverdin covalently via a thioether link to cysteine. Photon absorption causes a rotation about the C15=C16 double bond of this chromophore, leading to signaling through the conserved PHY domain to a modular output domain. The Forest lab's research goals include (1) understanding the structure/function relationships of bacterial phytochromes and (2) exploiting these photoreceptors as fluorescent biotechnology tools. To the first aim we are testing the hypothesis that the knot may rigidify the photosensory core of phytochrome so that energy available in the absorbed photon is used to reposition the effector domain appropriately in the transition from dark to lit state, rather than permitting energy losses to random motions. To the second aim, our structure-based amino acid substitutions within the chromophore-binding pocket have led to the development of near-infrared biomarkers. Current work includes improvement of the quantum yield and further size reduction of these phytofluors.