

# Synthesis of Materials for Non-Linear Optical Applications

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## **Overview:**

One objective in the design of new materials is to make substances that have the ability to be transparent to low intensities of light, but become opaque when the light intensity is much higher. On top of that, the material must respond very rapidly to changes in intensity so that it could block strong pulsed lasers. The materials are therefore sort of ultrafast reversible lenses (become dark in sunlight and clear indoors). Recently we have been working on the synthesis of a variety of complexes of the noble element Osmium for this purpose. The complexes contain nitrogen heterocyclic ligands that have optical properties matched to the Osmium and will help to optimize the ultrafast response of the complexes. Our need is to develop additional derivatives that extend the response of the complexes to the near-infrared portion of the electromagnetic spectrum.

## **Objective:**

Develop organic syntheses of bipyridine and terpyridine ligands and osmium(II) complexes. In addition, you will test the complexes by various instrumental methods including time resolved laser spectroscopy.

## **Prerequisites:**

A student with a background in Organic Chemistry is preferred. The student will spend most of his/her time doing synthesis of organic and metal organic compounds. Students will gain experience in synthetic methodology, NMR spectroscopy and fluorescence spectroscopy.