a. PRF# 56501-DN17
b. Organocatalyzed Atom Transfer Radical Polymerization of Petroleum-Relevant Monomers Using Perylene Dyes as Visible-Light Photocatalysts
c. Garret Miyake, Colorado State University

Research Progress. The *central objective* of this PRF supported research is to gain a fundamental understanding of organocatalyzed atom transfer radical polymerization (O-ATRP) to allow for the rational design of organic photoredox catalysts (PCs) that can polymerize petroleum derived monomer substrates to well-defined polymers of target molecular weights (MWs) and low dispersities (*Đ*). Toward this objective, we have recently investigated the structure-property relationships of core-substituted *N*-aryl phenoxazines as organic PCs for O-ATRP (Figure 1). Specifically, we have investigated the effects of the core-substitution as well as the identity of the *N*-aryl moiety on the photophysical and photophysical properties of these molecules and proposed how these properties influence the success of these molecules as PCs for O-ATRP (*J. Am. Chem. Soc.* **2018**, *140*, 5088-5101). As efficient light irradiation is essential to the success of PCs in O-ATRP, polymerization reactions performed in flow reactor systems can facilitate uniform irradiation. This grant also supported the efforts for a graduate student to write a Perspective on photoinduced controlled radical polymerizations performed in flow (*Chem. Mater.* **2018**, *30*, 3931-3942).

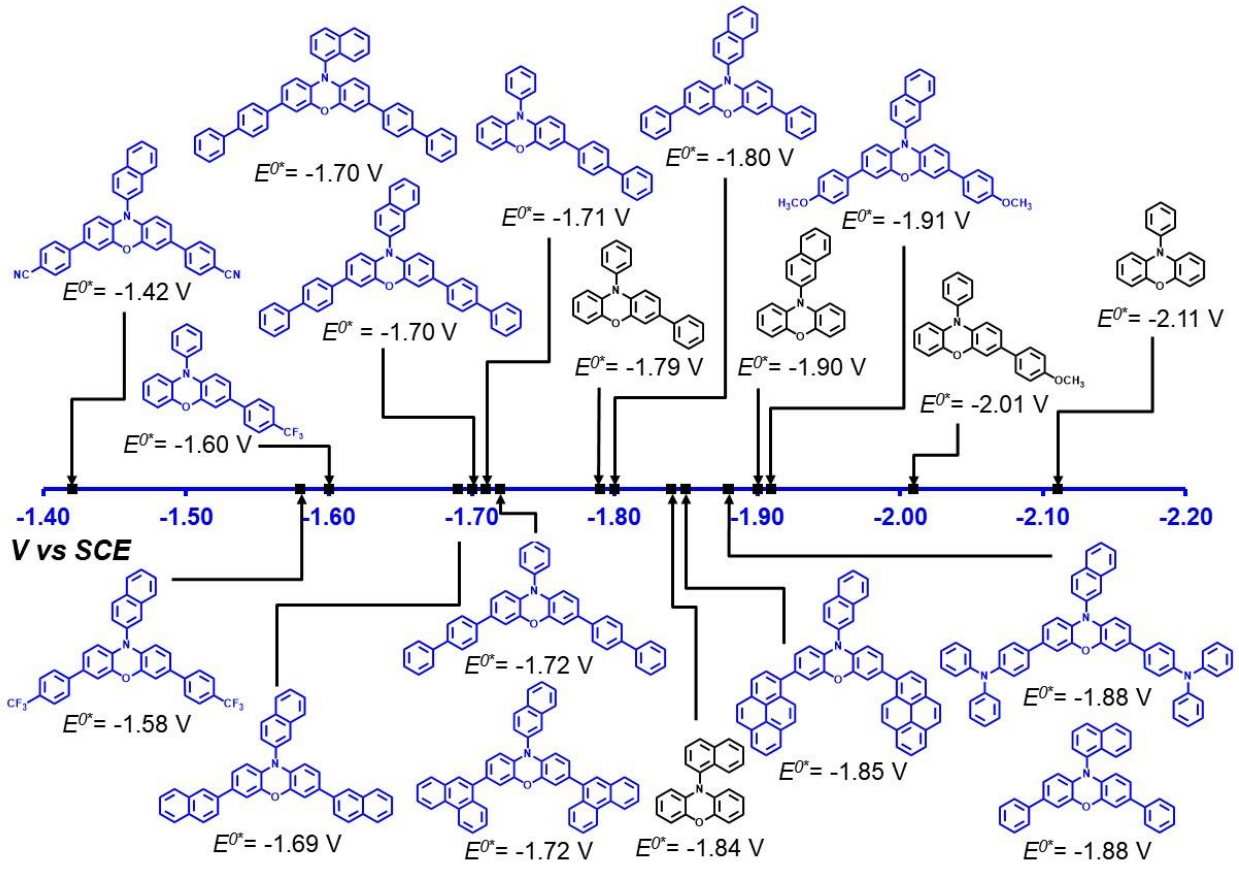

Figure 1. Structures and computed triplet excited state reduction potentials of *N*-Aryl Phenoxazines.

Impact of this Grant on Participants. Over the course of this last year this grant has partially supported the efforts of four graduate students. This support has enabled these students to dedicate periods of time entirely to their research training as well as provided research supplies, which will ultimately accelerate their development as scientists and obtain their career objectives. Furthermore, this grant has enabled the PI resources to pursue his research interests and further investigate the design of organic PCs for O-ATRP.