A Radical Approach to Polycycles Using Carboxylic Acids

Over the nine weeks of the fellowship, two principle reagents were synthesized for application in the reaction intended with a multi-step synthesis and 24 test reactions were conducted to screen for the desired product and optimize intermediate product yield. After proton and fluorine NMR spectra were collected and analyzed to identify the compounds in the reaction mixture, GCMS was conducted during the data analysis process to verify that no desired product was formed. Although the anticipated product was not formed, a useful intermediate is formed in significant quantities, which may be used to subsequently access a known reaction that yields the desired product. The intermediate (formed from a radical transition state that readily reacts with more xanthate material) was identified through NMR spectroscopic analysis that confirmed a suspected byproduct mechanistic pathway. In the future, I would like to use known chemistry to transform the intermediate into the desired product. This multi-step synthesis would still avoid the use of transition metal catalysts, and indirectly achieve the desired reaction.