Abstract
Bisphenol A (BPA) is an ubiquitous chemical vital to the polymer industry and used in the production of thermal printing paper. However, BPA, which is made from non-renewable resources, is a known estrogen mimic: thus environmental exposure may cause hormonal cancers and reproductive abnormalities. In this project, monomers with structural properties mimicking BPA were targeted for synthesis from renewable feedstocks (green chemistry). All eleven desired chemical compounds were synthesized via solvent free (neat) or two-phase (aqueous/organic) conditions. After syntheses, monomers were purified using column chromatography and characterized (MP, FTIR, ^{1}H NMR, ^{13}CNMR). The estrogenicity of several of the purified BPA mimics have been determined in a yeast assay performed in collaboration with Dr. Sheeler's group at Liberty University. Once the remaining monomers have been screened for estrogenic activity and the structure-activity relationship has been determined, the monomers with the best performance in the yeast assay will be scaled up and copolymerized with 4,4'-diaminodicyclohexyl methane to produce thermoset epoxy resins. Materials will be characterized for their physical properties creating a structure-property relationship, relating the chemical structure to polymer properties. As a result of these efforts, the discovery of a less estrogenic BPA mimic and the optimization of a synthetic method using renewable starting materials will be accomplished. These molecules may prove useful in of the development of a cleaner, greener, and more efficient approach to the thermal printing process and may eventually displace BPA from some industrial operations: both consequences will result in the removal of estrogenic toxicants from the environment.