Synthesis of Diarylnorbornadiene Derivatives and their Potential Use in Solar to Thermal Energy Conversion

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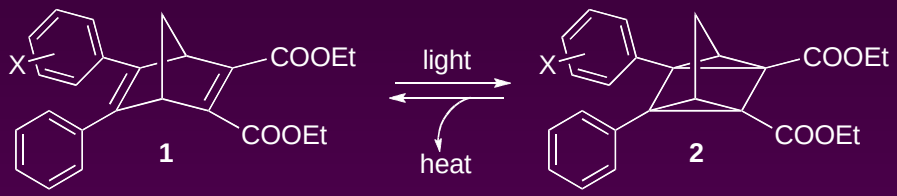

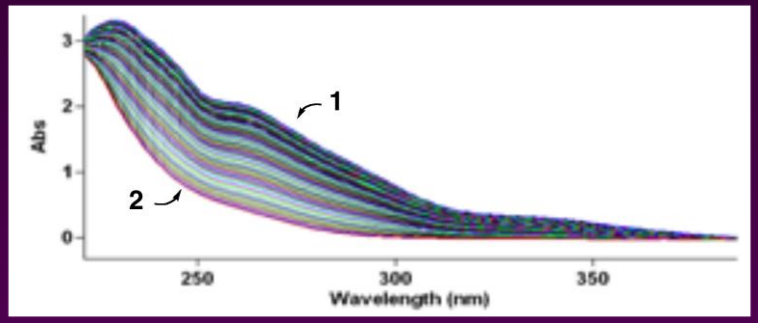

Our research involves the synthesis and study of diarylnorbornadiene compounds (**1**). These materials can undergo a photochemical [2 + 2] cycloaddition to form the corresponding quadricyclane (**2**). Since the resulting ring strain of the quadricyclane can later be released in the form of heat, these compounds have been envisioned as having applications in solar to thermal energy conversion. Utilizing a two-step procedure developed in our lab, we have synthesized and purified a library of thirteen derivatives of (**1**) in which the substituent on one of the aromatic rings has been varied. We have also investigated the effect of these substituents on the stability of the resulting quadricyclanes by monitoring the kinetics of the thermal reversion via UV-Visible spectroscopy. We have found that the quadricyclane is stabilized by electron-withdrawing groups in the *meta* position (though *destabilized* by most *para* substitutuents), suggesting that the reversion occurs via a free-radical pathway. Current efforts are directed towards the synthesis and study of derivatives (**3**-**5**) in which we vary substituents at other positions of the norbornadiene skeleton.