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Tesis: "STEADY-STATE AND TIME-RESOLVED SPECTROSCOPIC ANALYSIS OF PORPHYRINS AND NOVEL CARBO-BENZENES: A COMPARATIVE STUDY"

Resumen:

Organic electronics has been an intense area of research in the last decades due to multiple emerging applications ranging from organic solar cells to organic memory devices. At the core of this developments are -conjugated molecules which given their high levels of conjugation and π electrons bare special electronic and optical properties. A special family of π-conjugated molecules known as carbo-benzenes has been studied for their properties in nonlinear optics and in determining their structure-property relationships. Recently [1] it was observed that carbo-benzenes have a spectroscopic behavior similar to porphyrins, another type of organic molecule found in fundamental biological processes such as photosynthesis and oxygen transport. In this sense, using steady-state and time-resolved spectroscopic techniques an attempt is made to understand to what extent are these two molecules similar and how their excited-state dynamics behave. The main objective of this work was the implementation of a transient absorption apparatus (design, mounting, characterization); and secondly, the study of the target molecular systems. Here it is shown that both have a similar behavior in the steady-state regime (absorption/emission) however rather different excited state dynamics as seen in the transient absorption data. Porphyrins present excited-state absorption that lives in the nanosecond regime meanwhile that of carbo-benzenes lasts less than 100 ps and features the formation of a triplet state within 2 ps. These results demonstrate that even when two molecular systems share structural similarities and UV-VIS data its excited-state dynamics can be completely different and have distinct transient photogenerated species. These investigations contribute to the general understanding of sub-ps processes in π-conjugated molecules and help in the design of more efficient devices based on them.