

Effect of pH, Ionic strength and Temperature on the Formation of J-Aggregate of an Azo Dye Chromotrope – 2R in Layer-by-Layer Film: A Spectroscopic Study

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Abstract

In this communication, we report regarding the successful preparation of ultrathin films on solid substrates of an anionic azo-dyes chromotrope 2R (CHR) in poly-(diallyldimethylammonium chloride) (PDDA) using the LbL self-assembled method. The spectroscopic and aggregating behaviours have been studied in the light of UV-visible absorption spectroscopy and atomic force microscopy (AFM). It was revealed from the results that the absorbance raises linearly as layer thickness is increased, implying regularity and highly predictable qualities from layer to layer. These films' photochemical behaviours were examined at various ionic strengths and pH levels. With the increase in ionic strength of the prepared solution, large red-shifted absorption spectra were observed and thereby suggesting the formation of aggregates. The pH and temperature variations in the dye solution have a significant impact on the loading behavior of tiny molecules CHR. Studies on the effect of temperature show that the molecules in the LbL film are oriented in a particular way. Additionally, the results of the spectroscopic investigation are supported by the grainy surface appearance of the LbL films as evidenced by the AFM studies.

Keywords: J-aggregate, CHR, PDDA, AFM, pH LbL.