# Study of Self Assembly Systems Formed by Malic Acid and Alkyloxy Benzoic Acids

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Self assembly systems formed by malic acid and alkyloxy benzoic acids are characterized. The ferroelectric ingredient malic acid formed double hydrogen bond with *p-n*-alkyloxy benzoic acids. Various hydrogen bonded complexes have been synthesized with malic acid and pentyl to dodecyloxy benzoic acid, respectively. Fourier transformation infrared (FTIR) studies confirm the hydrogen bond formation. Polarizing optical microscopic (POM) studies revealed the textural information while the transition and enthalpy values are calculated from differential scanning calorimetry (DSC) studies. A phase diagram has been constructed from the POM and DSC studies. A new smectic ordering, smectic X*, has been identified which exhibits a finger print type texture. This phase has been characterized by POM, DSC, helix, and tilt angle studies. The transition from traditional cholesteric to smectic X* phase is observed to be first order. The tilt angle data in this phase has been fitted to a power law and the temperature variation of the tilt angle follows mean field theory predictions. The results of FTIR, POM, DSC, tilt angle, and helicoidal studies are discussed.

*Key words:* Malic Acid; *p-n*-Alkyloxy Benzoic Acid; Smectic X* Ordering.