

## STRUCTURE-PROPERTIES RELATIONSHIPS

The relationship between molecular structure and molecular properties has been a cornerstone of physical-organic chemistry for more than half a century. What it does is to establish a series of paradigms for predicting how various chemical structures will result in a plethora of physical properties, based on both enthalpic and entropic effects. Because our group thrives on the synergy of chemistry with chemical engineering, we have applied such techniques successfully to a great variety of situations in the past.

For example we have used these methods to characterize and modify a great many novel tunable solvents, such as supercritical fluids, nearcritical water, and gas-expanded liquids. Similarly we have exploited them to correlate, predict, and modify a variety of thermodynamic properties, as for example heats of solution and phase equilibria. We have used them to study and modify reaction processes. Finally we have even used them to design a solvent-free paint for aircraft.