

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Electric multipole interactions in an extended BEG model

TERESA BURNS, Coastal Carolina University, JR DENNISON, Utah State University — General 2D dielectric phase diagrams and phase transitions for multipolar molecules adsorbed to a square ionic crystal are presented. The adsorbed molecules are modeled using a dilute spin-one Ising model in the Blume-Emery-Griffiths formalism, using a mean-field approximation. Physical constants such as the electric multipole moments and binding energies are used to uniquely determine the interaction parameters over the full range of physically-relevant values. We find that temperature- and coverage-dependent antiferroelectric to ferroelectric, coverage-dependent ferroelectric up to ferroelectric down, reentrant ferroelectric to ferroelectric, and order-disorder dipole phase transitions can occur. The results are presented as a quasi-continuous set of phase diagrams. Extensions into ferro-electric parameter space are discussed and connections to analytical solutions are explored.

Teresa Burns
Coastal Carolina University

Date submitted: 13 Nov 2012

Electronic form version 1.4