

3-18-2013

Electric Multipole Interactions in an Extended BEG Model

Teresa Burns

JR Dennison

Utah State University

Follow this and additional works at: http://digitalcommons.usu.edu/mp_post

 Part of the [Physics Commons](#)

Recommended Citation

Burns, Teresa and Dennison, JR, "Electric Multipole Interactions in an Extended BEG Model" (2013). American Physical Society March Meeting 2013. *Posters*. Paper 14.

http://digitalcommons.usu.edu/mp_post/14

This Poster is brought to you for free and open access by the Materials Physics at DigitalCommons@USU. It has been accepted for inclusion in Posters by an authorized administrator of DigitalCommons@USU. For more information, please contact dylan.burns@usu.edu.



American Physical Society March Meeting 2013



Baltimore, MD

March 18-22, 2013

Electric multipole interactions in an extended BEG model

Teresa Burns¹ and J.R. Dennison²

¹ *Coastal Carolina University*

² *Physics Department, Utah State University*

Abstract

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.