Effect of Dipole-Dipole Charge Interactions on the Coagulation of Fractal Aggregates LORIN MATTHEWS, TRUELL HYDE, CASPER - Baylor University — The coagulation of charged aggregates consisting of micron-sized dust grains is an important process in fields as diverse as planet formation and plasma processing of silicon wafers for computer chips. The coagulation rate is of particular interest in the plasma and radiative environment of a protoplanetary disk around a newly formed star, as recent evidence suggests that planet formation is very efficient and takes place on a relatively short time scale. Although it would seem intuitively obvious that like-charged grains would repel each other and reduce coagulation rates, the distribution of charge over the fractal structure of the aggregates can play a role in increasing the coagulation rate. In this study, we use a self-consistent N-body code to model the dipole-dipole interactions of charged aggregates during the coagulation process. The charge on the aggregates (monopole and dipole moments) is calculated using a heuristic scheme based on a detailed charging model for fractal aggregates using a modified orbital-motion limited theory.

Truell Hyde
CASPER - Baylor University

Date submitted: 17 Jul 2007   Electronic form version 1.4