The charge distribution of small particle and in particular for particle less than 10 nm is critical for aerosol dynamics while it controls particle coagulation [1]. Particle charge distribution is well described by Gaussian distribution [2] but this assumption is no more valid for such small particle. In this study we developed a Fokker Planck method using Monte Carlo simulation to describe the charge state of particle in a plasma.

The model captures gaussian distribution for large particle. However for small particle sizes the distribution is very narrow, large fraction of them are neutrals [3] and cannot be described by a gaussian.

This charge fluctuation effect has been studied for different plasma conditions and has to be taken into account when considering for coagulation in dusty plasmas.