Insulator – Insulator Contact Charging as a Function of Pressure

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Abstract: Metal – metal and metal – insulator contact or triboelectric charging are well known phenomena with good theoretical understanding of the charge exchange mechanism. However, insulator – insulator charging is not as well understood. Theoretical and experimental research has been performed that shows that the surface charge on an insulator after triboelectric charging with another insulator is rapidly dissipated with lowered atmospheric pressure. This pressure discharge is consistent with surface ions being evaporated off the surface once their vapor pressure is attained. A two-phase equilibrium model based on an ideal gas of singly charged ions in equilibrium with a submonolayer adsorbed film was developed to describe the pressure dependence of the surface charge on an insulator. The resulting charge density equation is an electrostatic version of the Langmuir isotherm.