

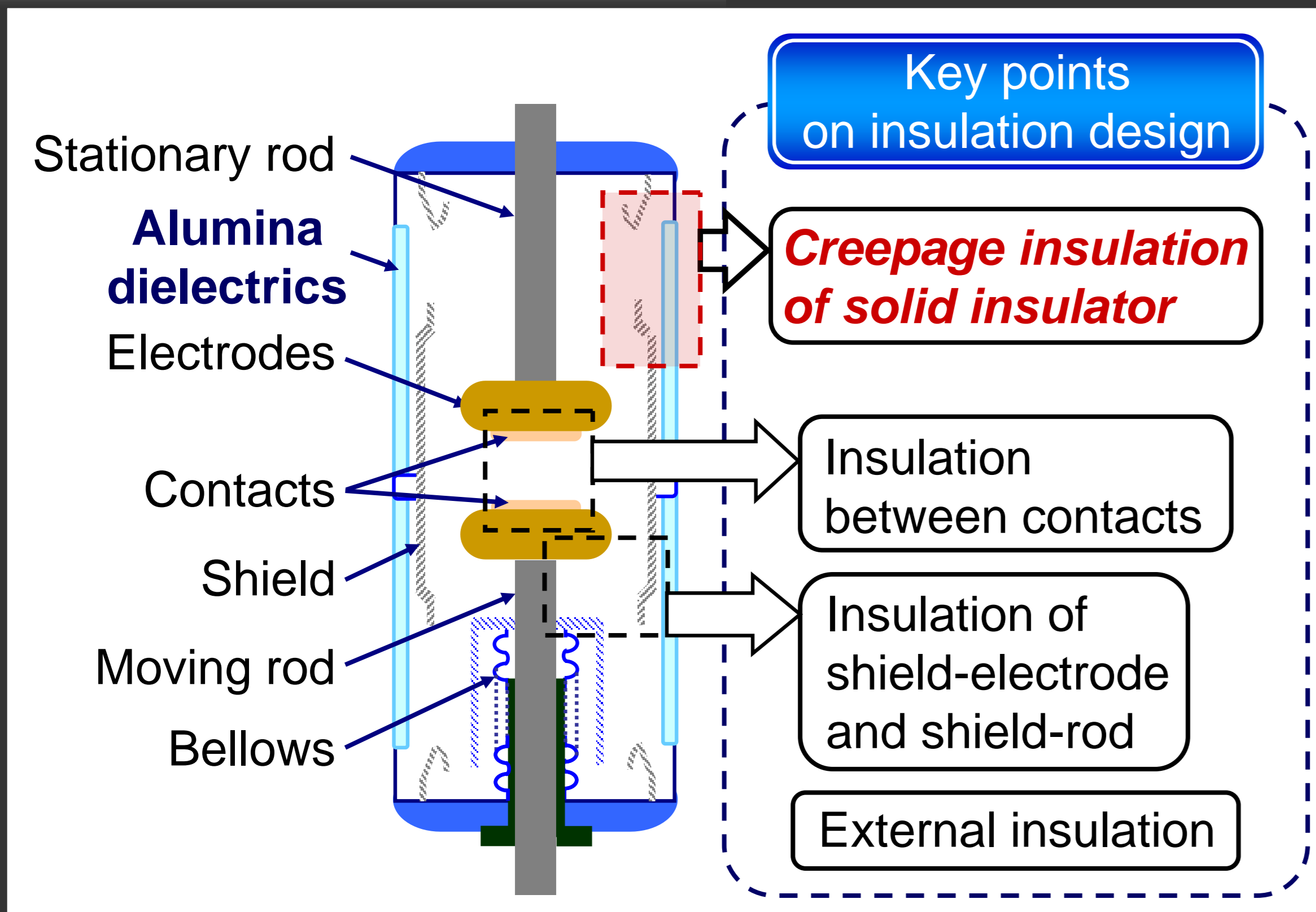
Influence of Surface Charges on Alumina Dielectrics on Impulse Flashover Characteristics in Vacuum

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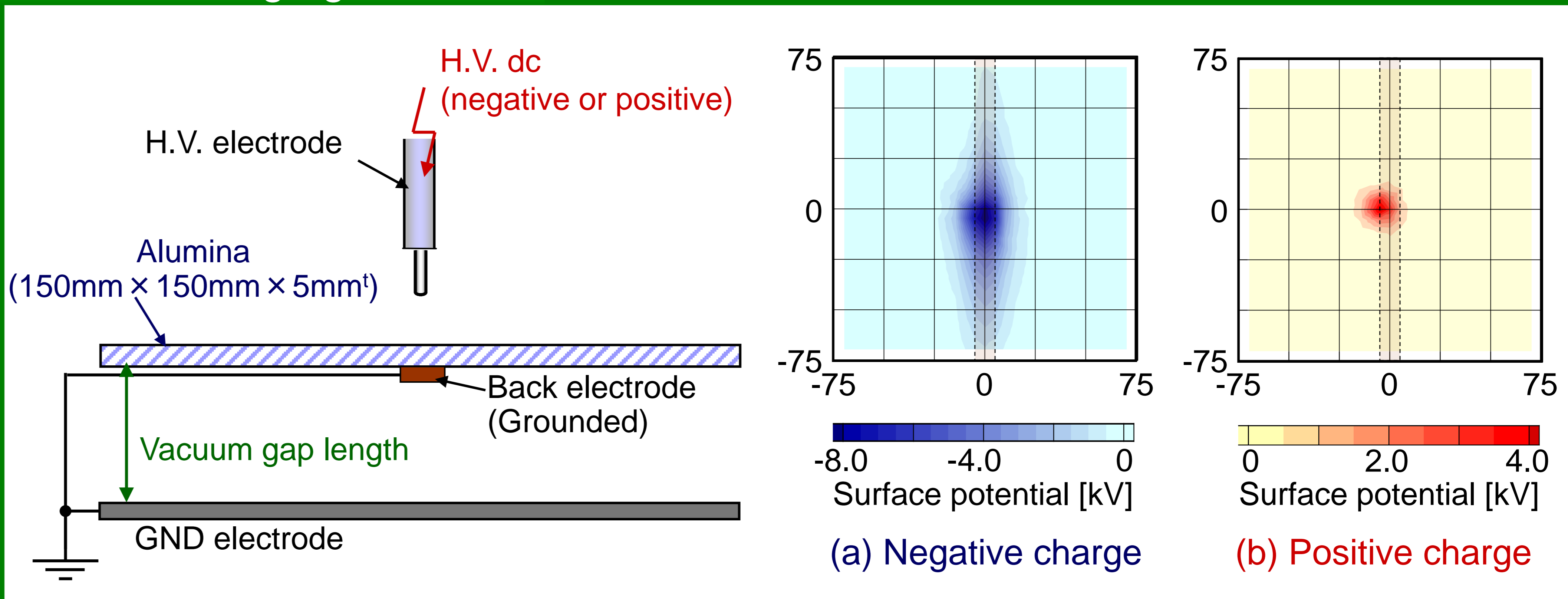
Introduction

In order to enhance the electrical insulation performance of vacuum circuit breakers (VCBs), the surface flashover mechanism on solid dielectrics in vacuum needs to be clarified. We investigated the surface flashover characteristics under the existence of surface charge on alumina ceramic insulator in vacuum. We investigated the dependence of the location and magnitude of surface charge on surface flashover characteristics. The experimental result revealed the influence of surface charges on surface flashover characteristics in vacuum.

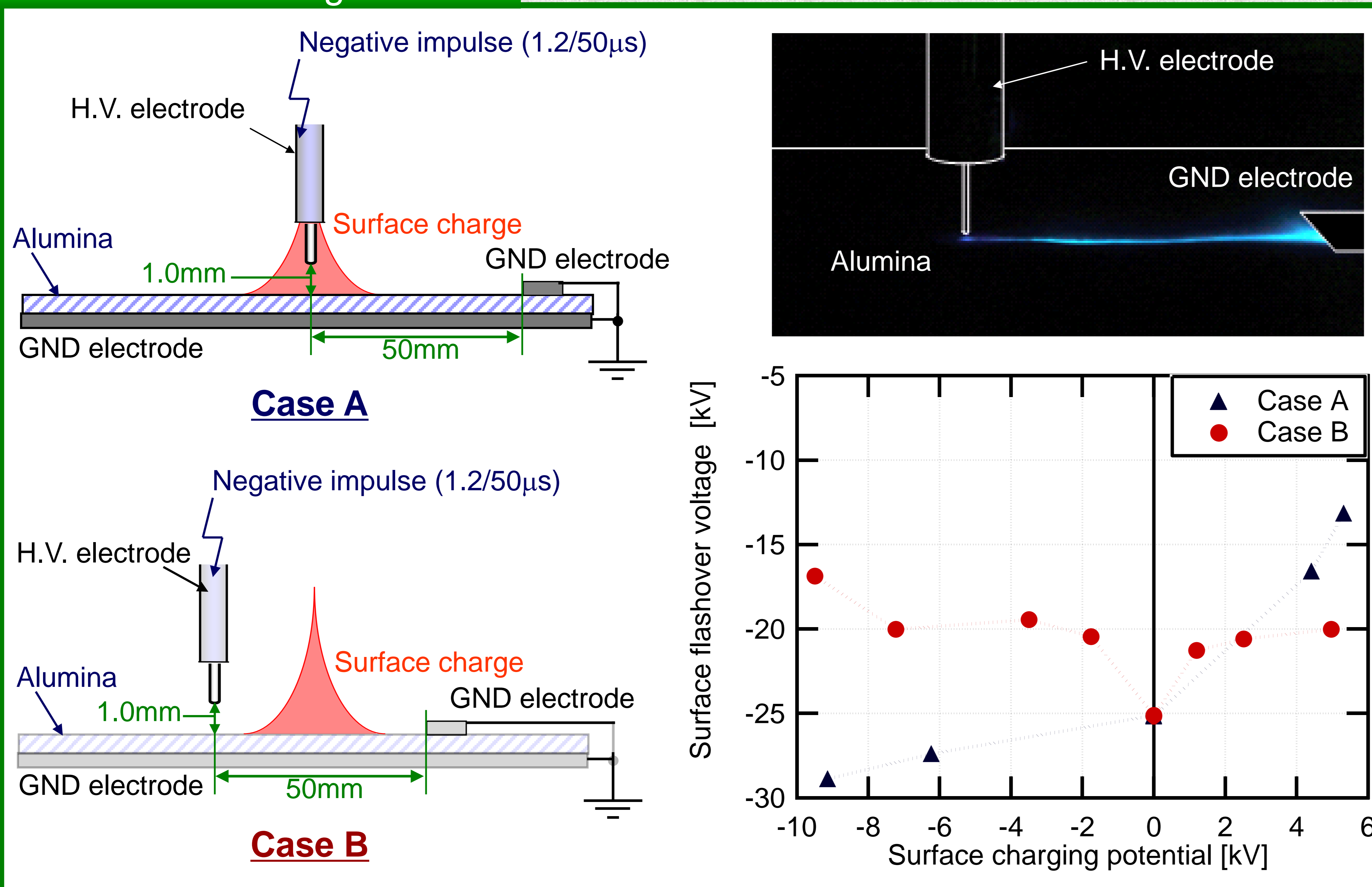
Vacuum circuit breaker



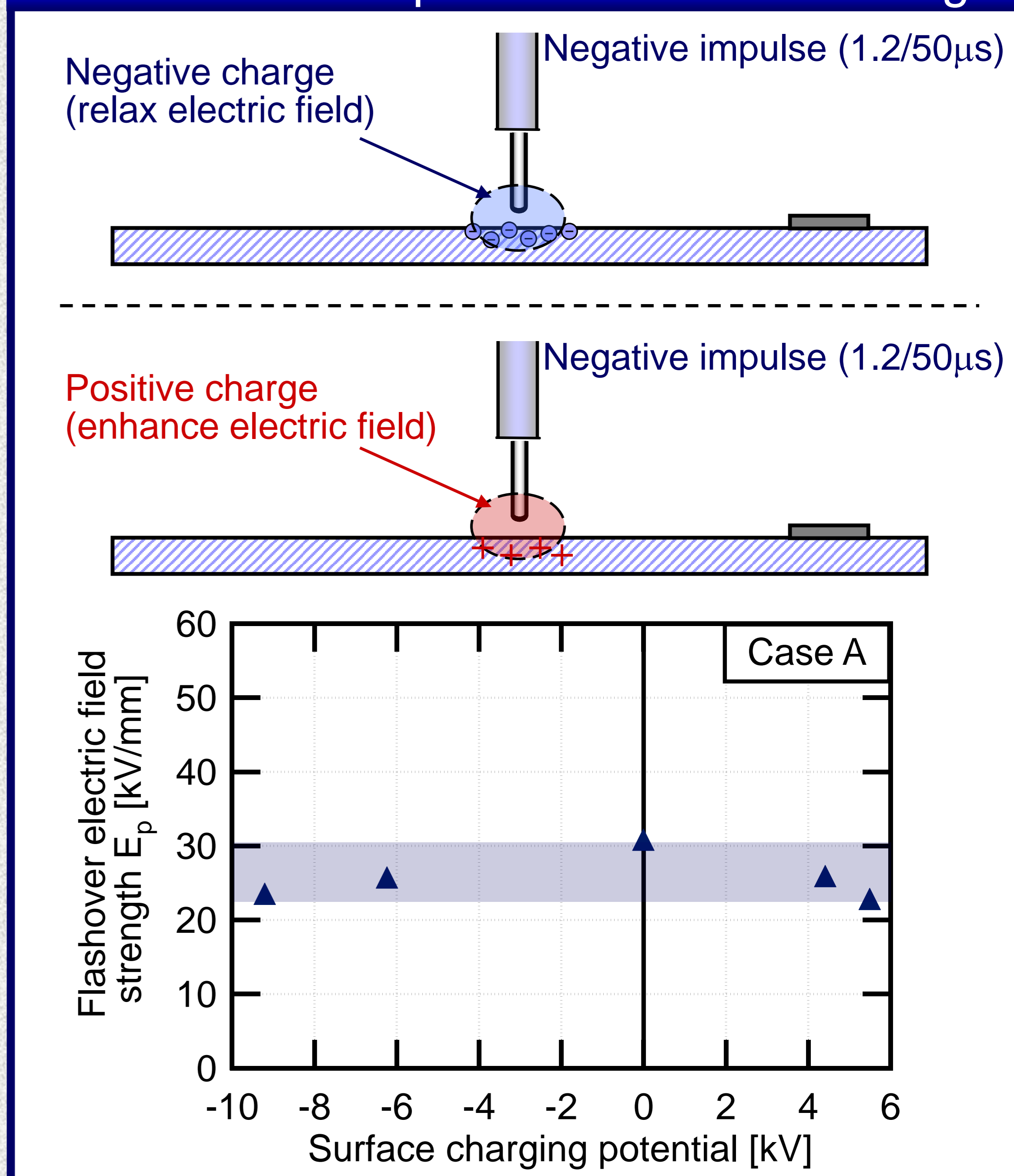
Surface charge generation



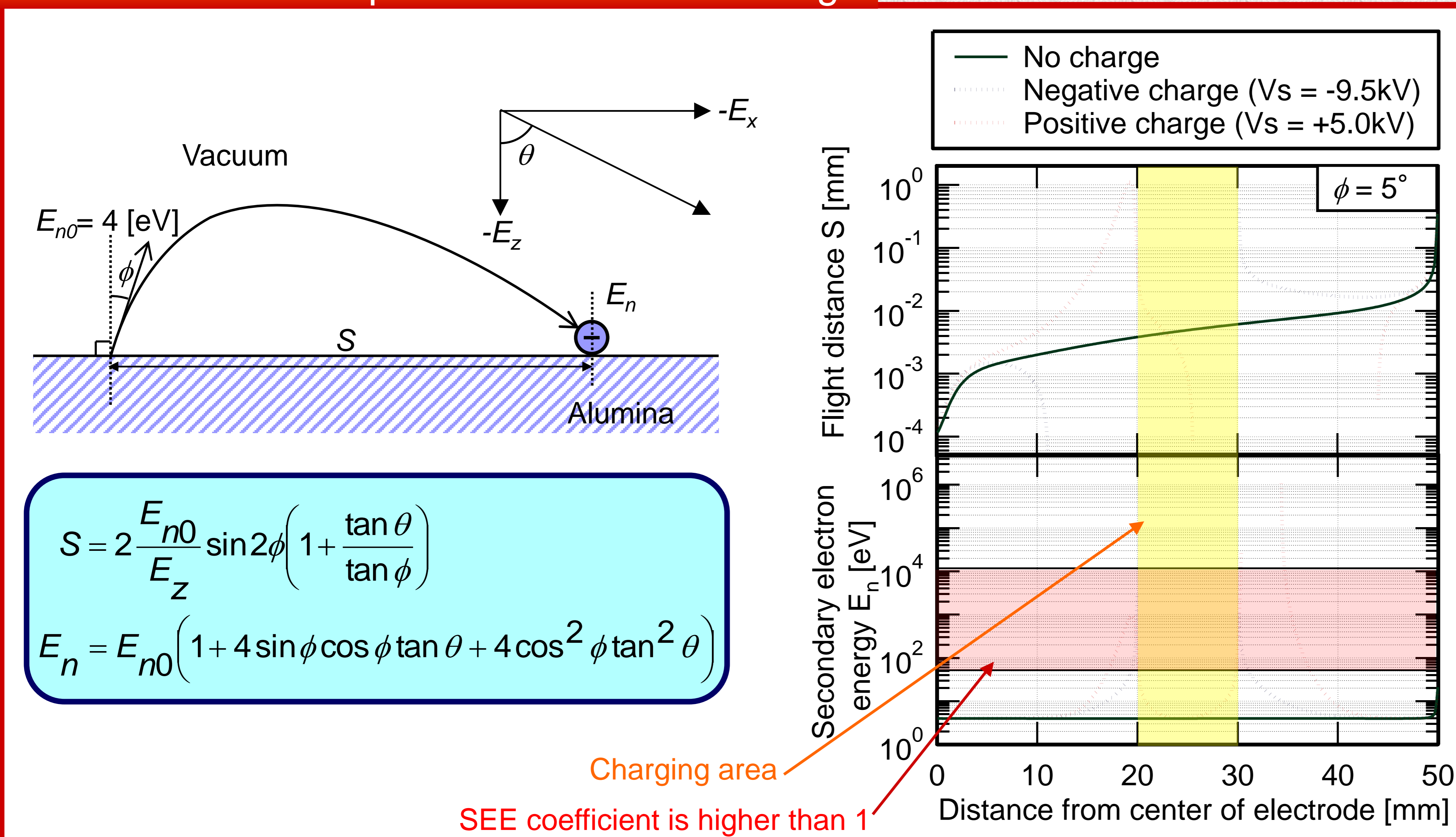
Surface flashover generation



Influence on inception of surface discharge



Influence on development of surface discharge



Conclusion

1. The surface charge is critical factors to the surface flashover phenomena.
2. When surface charge located near the cathode electrode (Case A), positive charge made surface flashover voltage lower and negative charge made surface flashover voltage higher. We could explain the results by the change of electric field at flashover by surface charge.
3. When surface charge located at the way of discharge path (Case B), either positive or negative charge made surface flashover voltage lower. We could explain the results by the role of surface charge for making the secondary electron energy higher for satisfying the condition of secondary electron emission avalanche.