

# The effect of surface charge, negative and bipolar ionization on the deposition of airborne bacteria

**Authors:** Meschke, S.<sup>1</sup>; Smith, B.D.<sup>1</sup>; Yost, M.<sup>1</sup>; Miksch, R.R.<sup>2</sup>; Gefter, P.<sup>3</sup>; Gehlke, S.<sup>3</sup>; Halpin, H.A.<sup>4</sup>

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## **Abstract:**

### **Aims:**

A series of experiments were conducted to evaluate the effect of surface charge and air ionization on the deposition of airborne bacteria. Methods and Results:

The interaction between surface electrostatic potential and the deposition of airborne bacteria in an indoor environment was investigated using settle plates charged with electric potentials of 0,  $\pm 2.5$  kV and  $\pm 5$  kV. Results showed that bacterial deposition on the plates increased proportionally with increased potential to over twice the gravitational sedimentation rate at +5 kV. Experiments were repeated under similar conditions in the presence of either negative or bipolar air ionization. Bipolar air ionization resulted in reduction of bacterial deposition onto the charged surfaces to levels nearly equal to gravitational sedimentation. In contrast, diffusion charging appears to have occurred during negative air ionization, resulting in an even greater deposition onto the oppositely charged surface than observed without ionization. Conclusions:

Static charges on fomite surfaces may attract bacteria resulting in deposition in excess of that expected by gravitational sedimentation or simple diffusion. Implementation of bipolar ionization may result in reduction of bacterial deposition. Significance and Impact of Study:

Fomite surfaces are important vehicles for the transmission of infectious organisms. This study has demonstrated a simple strategy for minimizing charge related deposition of bacteria on surfaces.

**Keywords:** air ionization; bioaerosol; environmental health; surface charge

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**Affiliations:** **1:** Department of Environmental & Occupational Health Sciences, School of Public Health & Community Medicine, University of Washington, Seattle, WA, USA **2:** IEH Laboratories & Consulting, Inc., Lake Forest Park, WA, USA **3:** MKS Ion Systems, Alameda, CA, USA **4:** Center for Health and Public Policy Studies, University of California, Berkeley, CA, USA