

Abstract Submitted  
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**An Explorative Study to Use DBD Plasma Generation for Aircraft Icing Mitigation**<sup>1</sup> HUI HU<sup>2</sup>, WENWU ZHOU, YANG LIU, CEM KOLBAKIR, Iowa State University — An explorative investigation was performed to demonstrate the feasibility of utilizing thermal effect induced by Dielectric-Barrier-Discharge (DBD) plasma generation for aircraft icing mitigation. The experimental study was performed in an Icing Research Tunnel available at Iowa State University (i.e., ISU-IRT). A NACA0012 airfoil/wing model embedded with DBD plasma actuators was installed in ISU-IRT under typical glaze icing conditions pertinent to aircraft inflight icing phenomena. While a high-speed imaging system was used to record the dynamic ice accretion process over the airfoil surface for the test cases with and without switching on the DBD plasma actuators, an infrared (IR) thermal imaging system was utilized to map the corresponding temperature distributions to quantify the unsteady heat transfer and phase changing process over the airfoil surface. The thermal effect induced by DBD plasma generation was demonstrated to be able to keep the airfoil surface staying free of ice during the entire ice accretion experiment. The measured quantitative surface temperature distributions were correlated with the acquired images of the dynamic ice accretion and water runback processes to elucidate the underlying physics.

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