Chemical effects caused by electrostatically charged regolith dust grains on analog lung tissues. M.J. Schaible[1], W.M. Ferrel[2], M. Horyani[3], J.D. Dufek[1], J.S. Mendez[4], T.M. Orlando[1], [1]School of Chemistry and Biochemistry, Georgia Institute of Technology (mjschaible@gatech.edu), [2]NASA Goddard Space Flight Center, [3]University of Colorado, Boulder, Department of Physics.

Introduction: Exploration of airless bodies in space carries significant risk to human health. In addition to well-known dangers from solar radiation and micrometeorites, fine particles from the regolith can irritate or produce toxic effects on human respiratory, ocular, and cardiovascular systems. Dust grains on airless bodies contain reactive or 'activated' surface sites due to exposure to ionizing radiation and meteorite impacts. The goal of this work is to characterize the surface reactivity of charged regolith grains and investigate the effects caused when grains come into contact with analog lung tissues composed of phospholipid films (DPPC) in the presence of H2O. DPPC is a major constituent of many pulmonary surfactants and is a commonly used molecule in the study of cell membranes.

Experimental: Crushed grains are held under ultra-high vacuum (UHV) conditions and electrostatically charged through triboelectric (frictional) charging or UV and electron exposure analogous to the conditions found on airless bodies in the inner Solar System. Grains will then be dropped through a Faraday tube charge measurement device and onto the DPPC films. Grain discharge and surface passivation is studied in pressurized environments of controlled composition. Film surface property changes due to charged dust grain exposure are characterized using x-ray photoelectron spectroscopy (XPS), in situ measurements of film conductance, and Fourier transform infrared (FTIR) spectroscopy. This abstract will present an overview and first results of the work to be completed.