

Laboratory Simulations in Ices and Minerals

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Abstract

We will present the experimental capabilities of our laboratory at Virginia that have been applied over the years to address questions concerning airless bodies in the solar system and interstellar space. The processes investigated are thermal processes (gas-surface interactions, sublimation, phase changes) and interactions of energetic ions and ultraviolet photons with materials that lead to desorption / sputtering, chemical synthesis and alterations, amorphization, and electrostatic charging). The presentation will include data showing new aspects or considerations about conventional techniques, such as infrared reflectance and temperature programmed desorption, but it will include some innovative or unconventional techniques, such as piezoelectric microgravimetry, electron spectroscopies, nanosecond laser ablation, and UV-visible spectroscopic interferometry. Our goal will be to show the community what can be measured and what are the opportunities for collaborations. This will be illustrated with results that have been useful to solve some concrete problems: photodesorption of ice mantles, molecular synthesis by radiolysis, Na atmospheres around the Moon and Mercury, and the recently discovered "fountains" of Enceladus.

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