



Ion irradiation of sulfur-bearing species relevant to the surfaces of icy satellites

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The surfaces of the moons of Jupiter and Saturn consist mainly of water ice and hydrated materials along with minor amounts of some volatiles. On Europa, Ganymede, and Callisto the presence of sulfur-bearing minor species such as elemental sulfur, sulfur dioxide, hydrogen sulfide, and hydrated sulfuric acid has been considered. A series of ongoing experiments relevant to clarify the origin of those species have been performed at the laboratory in Catania:

- Implantation of sulfur ions into water ice. It has been found that hydrated sulfuric acid is formed with high yield (0.65 ± 0.1 molecules/ion) (Strazzulla et al. 2007).
- Implantation of protons into sulfur dioxide produces mainly sulfur trioxide, polymers, and ozone but not H-S bonds.
- Ion irradiation of water ice deposited on sulfurous materials looking to the formation of new species at the interface (ion mixing) (Gomis and Strazzulla 2008). We have not found evidence for the efficient synthesis sulfur dioxide. In the case of residues rich in species containing S-H bonds hydrogen sulfide is formed (Strazzulla et al. 2009).
- Mixtures containing carbon and sulfur bearing species have been recently considered. The results obtained so far will be described.

References:

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