**ELECTRONIC SPUTTERING OF SILICATES AS PLANETARY SURFACES ANALOGUES.** R. Martinez[1], A.N. Agnihotri[2], M.E. Palumbo[3], G. Strazzulla[3], P. Boduch[2], A. Domaracka[2], H. Rothard[2], and E.F. da Silveira[4], [1]Departamento de Física, Universidade Federal do Amapá, Brazil, [2]CIMAP Normandie Univ, ENSICAEN, UNICAEN, CEA, CNRS, 14000 Caen, France, [3]INAF-Osservatorio Astrofisico di Catania, Italy, [4]Departamento de Física, Pontifícia Universidade Católica do Rio de Janeiro, Brazil.

Silicates, like nepheline, are thought to be good analogues for planetary surfaces [1]. Silicates are particularly abundant on asteroids, on planets like Mercury and Earth and on the Moon. Energetic ions, constituents of solar wind and cosmic rays, impinge constantly on those surfaces inducing several processes, among them, sputtering. In particular, cosmic rays trigger secondary ion emission from unprotected surfaces. The knowledge of desorption processes helps understanding how exospheres around comets and on planets are formed and give hints about their composition [1,2].

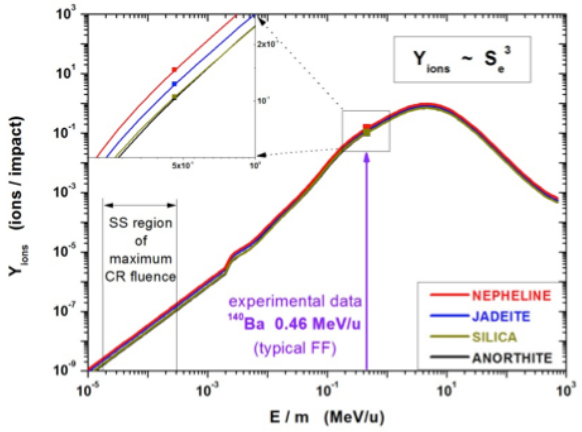


Figure 1: Predicted Total Yields (Y) of Secondary Ions ejected from Anorthite, Nepheline, Jadeite and Silica under impact of heavy ions as a function of the projectile energy. The experimental points for 252Cf FF projectiles are shown.

Sputtering yields of silicates were measured with highly charged ion beams at GANIL (France) and at PUC-Rio (Brazil), under UHV conditions. More specifically, secondary ion emission from nepheline has been investigated when irradiated by keV/u and MeV/u projectile ions delivered by GANIL using an imaging XY-TOF-SIMS device and by MeV/u projectile ions at PUC-Rio, using the TOF-PDMS technique (time-of-flight plasma desorption mass spectrometry) which uses fission fragments (FF) produced by a $^{252}$Cf source. In all cases, positive secondary ion mass spectra from nepheline are mainly characterized by masses at 23 u and 39 u, which can be assigned to $Na^+$ and $K^+$. In addition, for MeV FF ion interaction, nepheline shows emissions of the $(Al_3O_n)^+$ positive secondary ion series and the $(SiO_2)_n^-$ and $(AlSi)O_m^-$ negative secondary ion series. In general, MeV ion bombardment induces anion emission less intense than cation emission due to the prompt secondary electron emission. However, our results show similar positive and negative ion yields. This is probably due to relatively low secondary electron emission and/or due to high electron capture by Si-containing molecules. Fig. 1 summarizes the predicted secondary ion sputtering yield dependence on projectile energy.

References:

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