

EXO-ELECTRON EMISSION AND SURFACE CHARACTERISTICS OF
LUNAR MATERIALS*

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ABSTRACT

Little or no natural TSEE (Thermally Stimulated Exoelectron Emission) has been observed in Apollo 12 lunar surface and core tube fines, unless an outer layer is removed by etching with $\text{HF}/\text{F}_2\text{SO}_4$. However, some natural TSEE around 600°C can be detected in untreated samples from the interior of crystalline rocks. Apparently, natural as well as artificial (gamma radiation induced) TSEE is inhibited by trapped solar wind.

Several intense artificial TSEE peaks located between about 130 and 550°C have been induced by pre-heating of samples in air. Corresponding heat treatment in vacuum or hydrogen fails to develop TSEE. These processes have been linked with the oxidation state of iron ions through parallel studies with iron powder. Adsorbed atmospheric species (O_2) also affect the TSEE characteristics. In general, TSEE is a sensitive diagnostic tool for detecting and investigating several subtle changes occurring at the surface, which have been studied in some detail. The findings have been complemented by scanning electron microscopy, EPR and gas adsorption measurements.

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