



The Effect of Surface Roughness on XRF and XRD: Modelling and Experiment

Graeme Hansford, K.S. Hill, R.M. Ambrosi, and J.C. Bridges

Space Research Centre, Department of Physics and Astronomy, University of Leicester, University Road, Leicester LE1 7RH.
UK

Both remote and in situ x-ray spectrometry plays an important role in the geochemical exploration of solar system bodies. In order to accurately interpret data from x-ray instruments, the effects of shadowing and surface roughness must be taken into account. Detailed modelling and experimental studies are required in order to disentangle the factors which contribute to the observed x-ray signature.

PoDFluX is a Monte Carlo ray-tracing model which calculates the x-ray fluorescence and diffraction from a powder sample from first principles [1]. An extension to this model includes detailed calculation of the effect of both microscopic and macroscopic roughness on x-ray fluorescence and diffraction, and details of this extension will be described. The results of a model study will be presented, and compared to preliminary experimental data.

[1] Graeme M. Hansford, "PoDFluX: a new Monte Carlo ray-tracing model for powder diffraction and fluorescence", *Rev. Sci. Instrum.*, 80, 073903 (2009), doi: 10.1063/1.3160018.