

**SPINELS RENAISSANCE: THE PAST, PRESENT, AND FUTURE OF THOSE UBIQUITOUS MINERALS AND MATERIALS**

## **Raman spectroscopy and the inversion degree of natural Cr-bearing spinels**

**DAVIDE LENAZ<sup>1,\*</sup> AND VANNI LUGHI<sup>2</sup>**

<sup>1</sup>Department of Mathematics and Geosciences, University of Trieste, Trieste, I-34127 Italy

<sup>2</sup>Department of Engineering and Architecture, University of Trieste, Trieste, I-34127 Italy

### **ABSTRACT**

Natural Cr-spinels previously characterized by X-ray single-crystal diffraction and electron microprobe have been analyzed by Raman spectroscopy. The results we report show that there is a strong correlation between the Cr/(Cr+Al) ratio (Cr#) and the  $A_{1g}$  mode for the studied spinels. A strong correlation of this mode with Mg/(Mg+Fe<sup>2+</sup>) (Mg#) can be seen only for spinels with Mg# higher than 0.60. Other modes can increase, decrease or disappear depending on the Cr#. Among the spinels with low Cr# it is possible to define their order/disorder degree. In fact, spinels with an inversion degree lower than 0.14 show an  $E_g$  mode at about 400–410 cm<sup>-1</sup>, while spinels with Cr# higher than 0.20 register the appearance of a peak in the region 150–200 cm<sup>-1</sup>, while other peaks are substituted by smooth curves. The results show that the use of Raman applied to spinel in provenance studies cannot yield a 100% confidence because of the uncertainties in the relation between Mg# and the different modes.

**Keywords:** Raman spectroscopy, natural spinels, order/disorder, provenance study