

LETTER

**Magnesium *K*-edge EXAFS study of bond-length behavior in synthetic pyrope-grossular garnet solid solutions**

**SIMONA QUARTIERI,<sup>1,\*</sup> FEDERICO BOSCHERINI,<sup>2</sup> CHIARA DALCONI,<sup>3</sup> GIANLUCA IEZZI,<sup>4,5</sup>  
CARLO MENEGHINI,<sup>6</sup> AND ROBERTA OBERTI<sup>7</sup>**

<sup>1</sup>Dipartimento di Scienze della Terra, Università di Messina, Italy

<sup>2</sup>Dipartimento di Fisica and CNISM, Università di Bologna, Italy

<sup>3</sup>Dipartimento di Scienze della Terra, Università di Ferrara, Italy

<sup>4</sup>Dipartimento di Scienze della Terra, Università G. d'Annunzio, Chieti, Italy

<sup>5</sup>Department of Seismology and Tectonophysics, Istituto Nazionale di Geofisica e Vulcanologia, Roma, Italy

<sup>6</sup>Dipartimento di Fisica “E. Amaldi” and CNISM, Università di Roma Tre, Italy

<sup>7</sup>Istituto di Geoscienze e Georisorse, unità di Pavia, CNR, Italy

**ABSTRACT**

Direct structural characterization of the changes in the local environment of Mg occurring in the garnet structure as a function of the Ca content are determined by Mg *K*-edge X-ray absorption fine structure on synthetic samples along the pyrope-grossular join. With increasing Ca content, the short Mg-O2 distance of the dodecahedron slightly decreases, while the long Mg-O4 distance tends to increase, so that the dodecahedron is more distorted in grossular-rich garnets than in end-member pyrope. This quantitative direct description of the changes in the local environment of Mg in the pyrope-grossular solid solution confirms and better defines previous experimental and recent computational results.

**Keywords:** Pyrope-grossular garnets, EXAFS, magnesium, local environment