## Fantappièite, a new mineral of the cancrinite-sodalite group with a 33-layer stacking sequence: Occurrence and crystal structure

## FERNANDO CÁMARA,<sup>1</sup> FABIO BELLATRECCIA,<sup>2,\*</sup> GIANCARLO DELLA VENTURA,<sup>2</sup> ANNIBALE MOTTANA,<sup>2</sup> LUCA BINDI,<sup>3</sup> MICKEY E. GUNTER,<sup>4</sup> AND MARCO SEBASTIANI<sup>5</sup>

<sup>1</sup>CNR-Istituto di Geoscienze e Georisorse, U.O.S. di Pavia, via Ferrata 1, 27100 Pavia, Italy

<sup>2</sup>Dipartimento Scienze Geologiche, Università Roma Tre, Largo San Leonardo Murialdo 1, 00146 Roma, Italy <sup>3</sup>Museo di Storia Naturale, Università di Firenze, Sezione di Mineralogia, and CNR-Istituto di Geoscienze e Georisorse, U.O.S. di Firenze, Via La Pira 4, 50121 Firenze, Italy

<sup>4</sup>Department of Geological Sciences, University of Idaho, Moscow, Idaho, 83844-3022, U.S.A. <sup>5</sup>Dipartimento di Ingegneria Meccanica e Industriale, Università Roma Tre, Via della Vasca Navale 79, I-00146 Roma, Italy

## ABSTRACT

This paper reports the occurrence and the crystal structure of fantappièite, a new member of the cancrinite-sodalite group of minerals from Torre Stracciacappe, Trevignano community (Rome, Latium, Italy). The mineral occurs within a volcanic ejectum consisting of dominant sanidine with minor plagioclase, biotite, augitic clinopyroxene, andradite, and iron oxides. Fantappièite (0.7 mm as largest size) is observed within miarolitic cavities of the rock as transparent colorless crystals, showing complex morphologies and striated faces. It is non-pleochroic and uniaxial negative,  $n_{\omega} = 1.5046(5)$  and  $n_{\varepsilon} = 1.5027(5)$ .  $D_{calc}$  is 2.471 g/cm<sup>3</sup>. Fantappièite is trigonal, space group  $P\overline{3}$ ; the cell parameters are: a = 12.8742(6), c = 87.215(3) Å, V = 12518.8(9) Å<sup>3</sup>, Z = 1. The empirical chemical formula is: (Na<sub>84.12</sub>Ca<sub>30.00</sub>K<sub>15.95</sub>Fe<sub>0.19</sub>Ti<sub>0.13</sub>Mn<sub>0.10</sub>Mg<sub>0.09</sub>)(Si<sub>99.36</sub>Al<sub>98.64</sub>)O<sub>396</sub>(SO<sub>4</sub>)<sub>30.24</sub>(CO<sub>3</sub>)<sub>0.29</sub>Cl<sub>0.84</sub>F<sub>0.82</sub>·5.18H<sub>2</sub>O, which corresponds to the ideal formula [Na<sub>82.5</sub>Ca<sub>33</sub>K<sub>16.5</sub>]<sub>\Sigma=132</sub>(Si<sub>99</sub>Al<sub>99</sub>O<sub>396</sub>)(SO<sub>4</sub>)<sub>33</sub>·6H<sub>2</sub>O.

The five strongest reflections in the X-ray powder pattern are [d in Å (1%) (hkl)]: 3.70 (100) (3 0 0), 3.60 (80) (1 0 23), 2.641 (65) (0 0 33), 6.85 (60) (0 1 10), 6.40 (55) (1 1 0).

The single-crystal FTIR spectrum rules out OH groups and shows the presence of  $H_2O$  and  $CO_2$  molecules, as well.

Keywords: New minerals, fantappièite, crystal structure, IR spectroscopy, mechanical properties