

Gasparite-(La), La(AsO₄), a new mineral from Mn ores of the Ushkatyn-III deposit, Central Kazakhstan, and metamorphic rocks of the Wannı glacier, Switzerland

OLEG S. VERESHCHAGIN^{1,*}, SERGEY N. BRITVIN^{1,6}, ELENA N. PEROVA¹, ALEKSEY I. BRUSNITSYN¹, YURY S. POLEKHOVSKY¹, VLADIMIR V. SHILOVSKIKH^{2,3}, VLADIMIR N. BOCHAROV², ATE VAN DER BURGT⁴, STÉPHANE CUCHET⁵, AND NICOLAS MEISSER⁶

¹Institute of Earth Sciences, St. Petersburg State University, University Emb. 7/9, 199034 St. Petersburg, Russia. Orcid 0000-0002-4811-2269

²Geomodel Centre, St. Petersburg State University, Uliyanovskaya St. 1, 198504 St. Petersburg, Russia

³Institute of Mineralogy, Urals Branch of the Russian Academy of Sciences, Miass 456317, Russia

⁴Geertjesweg 39, NL-6706EB Wageningen, The Netherlands

⁵ch. des Bruyeres 14, CH-1007 Lausanne, Switzerland

⁶Musée cantonal de géologie, Université de Lausanne, Anthropole, 1015 Lausanne, Switzerland

⁷Kola Science Center, Russian Academy of Sciences, Fersman Str. 14, 184209 Apatity, Murmansk Region, Russia

ABSTRACT

Gasparite-(La), La(AsO₄), is a new mineral (IMA 2018-079) from Mn ores of the Ushkatyn-III deposit, Central Kazakhstan (type locality) and from alpine fissures in metamorphic rocks of the Wannı glacier, Binn Valley, Switzerland (co-type locality). Gasparite-(La) is named for its dominant lanthanide, according to current nomenclature of rare-earth minerals. The occurrences and parageneses in both localities are distinct: minute isometric grains up to 15 μm in size, associated with friedelite, jacobsite, pennantite, manganhumite series minerals (alleganyite, sonolite), sarkinite, tilasite, and retzian-(La) are typically embedded into calcite-rhodochrosite veinlets (Ushkatyn-III deposit) vs. elongated crystals up to 2 mm in size in classical alpine fissures in two-mica gneiss without indicative associated minerals (Wannı glacier). Their chemical compositions have been studied by EDX and WDX; crystal-chemical formulas of gasparite-(La) from the Ushkatyn-III deposit (holotype specimen) and Wannı glacier (co-type specimen) are (La_{0.65}Ce_{0.17}Nd_{0.07}Ca_{0.06}Mn_{0.05}Pr_{0.02})_{1.02}[(As_{0.70}V_{0.28}P_{0.02})_{1.00}O₄] and (La_{0.59}Ce_{0.37}Nd_{0.02}Ca_{0.02}Th_{0.01})_{1.01}[(As_{0.81}P_{0.16}Si_{0.02}S_{0.02})_{1.01}O₄], respectively. In polished sections, crystals are yellow and translucent with bright submetallic luster. Selected reflectance values R_1/R_2 (λ , nm) for the holotype specimen in air are: 11.19/9.05 (400), 11.45/9.44 (500), 10.85/8.81 (600), 11.23/9.08 (700). The structural characteristics of gasparite-(La) were studied by means of EBSD (holotype specimen), XRD, and SREF (co-type specimen). Gasparite-(La) has a monoclinic structure with the space group $P2_1/n$. Our studies revealed that gasparite-(La) from the Ushkatyn-III deposit and Wannı glacier have different origins. La/Ce and As/P/V ratios in gasparite-(La) may be used as an indicator of formation conditions.

Keywords: Gasparite-(La), new mineral, arsenate, REE, Mn ores, monazite-type structure, Ushkatyn-III, Kazakhstan, Wannı glacier, Binn Valley, Switzerland