

GEMOLOGICAL CHARACTERISTICS OF CORUNDUM FROM GIA NGHIA, SOUTHERN VIETNAM

ลักษณะเฉพาะทางอัญมณีวิทยาของพลอยคอร์ันดัมจากแหล่งเกียเจีย, ประเทศเวียดนามตอนใต้

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Extended Abstract

Thailand is one of the most famous gem market of the world. Corundum is the most crucial materials for these industries. That leads to rapid reduction of corundum reserves in Thailand. Consequently, gem deposits from other countries are demanded to support the industries. Vietnam is a crucial prospect of gem deposit, ruby and sapphire in particular. It has abundant gem corundums that have been extensively mined for a few decades. Gia Nghia corundum from southern Vietnam is a prospect for future development. Thirty-seven samples of blue sapphires from Gia Nghia deposit were selected for detailed study. All of the samples were cut and polished as flat surfaces parallel to the c-axis before further investigation (Fig.1). Their optical properties fall within common corundum range (Table 1). Luminescence under ultraviolet lamp is inert under both long wave and short wave waves. The common mineral inclusions are feldspar and zircon. Feldspar crystals are characterized by colorless crystal, whereas, zircon inclusions appear to have been formed a single crystal. Trace element analyses reveal rather high iron content (1.07-3.20 %wt), based on semi-quantitative EDXRF analysis (Table 2). Colors of sapphire sample are indicated, using UV-VIS-NIR spectra (Fig. 2) and trace elements, as mainly caused by Fe and Ti for most of the blue sapphire samples. UV-VIS-NIR spectrograms show absorption bands due to Fe²⁺/Ti⁴⁺ and Fe²⁺/Fe³⁺ intervalence charge transfers with the maximum at 571 and 579 nm, respectively, and absorption peaks due to Fe³⁺ at 377, 378 and 870 nm. The absorption band in the near infrared (NIR) with a maximum at around 850 nm is typically found in basaltic sapphire. Fourier Transform Infrared (FTIR) spectrograms (Fig. 3) show absorptions due to structural O-H stretching peaks at 3309 cm⁻¹. Although Gia Nghia corundum samples could not be distinctly separated clearly from basaltic corundum elsewhere, they have extremely high iron content compared with the other basaltic sapphires, besides, some features (e.g. mineral inclusion, trace composition and absorption spectra) may also be useful for gemological laboratory to recognize the gem origin.

R.I.	$n_x =$ $n_o =$	1.762 - 1.765 1.770 - 1.775
Birefringence		0.008 - 0.010
Specific Gravity		3.99 - 4.05
Luminescence	SWUV LWUV	Inert Inert

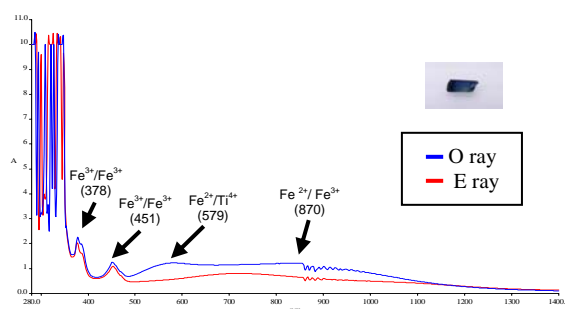


Table 1.) Summary of basic gemological properties of blue sapphires from Gia Nghia, Southern Vietnam.

Fig. 2) showing the UV-VIS-NIR spectrogram of a blue sapphire from Gia Nghia.



Fig.1) Corundum collection from Gia Nghia, Southern Vietnam was polished and used under this study.

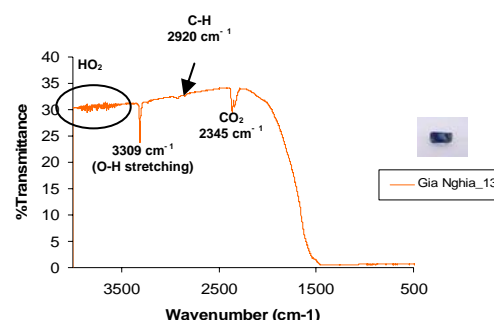


Fig.3) showing the FTIR spectrogram of sapphire from Gia Nghia.

Localities (numbers of sample)	Trace Elements (Wt.%)				
	Ga ₂ O ₃	TiO ₂	V ₂ O ₅	Cr ₂ O ₃	Fe ₂ O ₃
Kanchanaburi (13)	< 0.05	0.02 - 0.20	< 0.02	< 0.03	0.48 - 1.76
Chanthaburi-Trat (74)	0.012 - 0.022	0.01 - 0.03	0.005 - 0.014	-	0.20 - 1.83
Inverell (27)	0.02 - 0.04	0.15	< 0.01	< 0.01	0.66 - 1.32
Cambodia (18)	0.03 - 0.22	0.03 - 0.86	< 0.01	< 0.02	0.38 - 2.08
Gia Nghia (20)	0.02 - 0.04	0.02 - 0.14	<0.01	<0.01	1.07 - 3.20

Table 2.) Composition of trace element oxides in the Gia Nghia blue sapphire with those of some basaltic blue sapphires.

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Keywords: Corundum; Inclusion; Trace element