Gem-Bearing Marble from Luc Yen Gem Deposit, Yen Bai, Northern Vietnam

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Abstract

Nowadays, precious stones from other countries throughout the world have been imported into Thailand to support the gem and jewelry industries. Vietnam is one of the most significant targets for various types of precious stone, such as corundum, spinel and tourmaline. In fact, Northern Vietnam has been known particularly as a major source of these gemstones. Geologically, marble appears to have been related to many precious stones in this area. Luc Yen is the most crucial gem deposit of the Northern Vietnam and it has been known throughout the world as the main gem market of this country. Geological mappping of the area was carried out by some workers but detailed studies on mineralogy and petrography have not been done in detail. The study area Luc Yen Yen Bai Northern Vietnam is located at east side of the Red River. Gem-bearing marble samples from Luc Yen can be divided into three groups, i.e., 1) corundum-bearing marble, 2) spinel-bearing marble, 3) marble without spinel-corundum (see Table 1). Most of the main assemblages (e.g. corundum, phlogopite, spinel, humite and calcite) in these marbles appear to have been originated from the Day Nui Con Voi metamorphic belt-Red River Fault Zone (Fig.1), except pyrrhotite. Some accessory minerals including pyrite and chlorite may be due change in tectonics. (Fig.3),(Table.2). That would also involve crystal modification of spinel to psudo anisotropic (Fig.2) appearance. Apatite, pyrite, rutile and garnet were formed as accessory mineral in some samples. It should be notified that pyrrhotite is reported for the first time confirmed by chemical analyses (see Fig.3 and Table.2). The precious stones (ruby and spinel) appear to have originated from the same event of regional metamorphism of calcareous rocks..

Keywords: Pseudo isotropic, pyrrhotite, Luc Yen

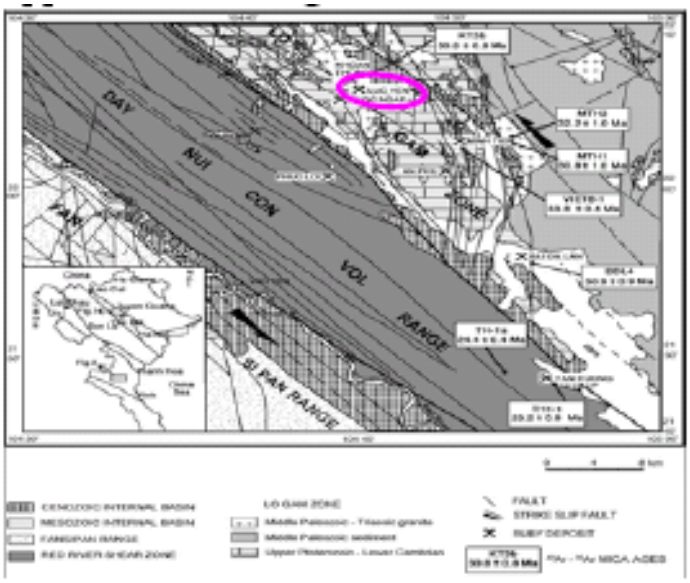

Figure 1: Geological map Luc Yen.

Table.1 Group of samples

Table 3.1 Showing mineral assemblages found in the sample collection under this study.

Number	Group	Mineral	Cal	Cor	Spl	Am	Phl	Po	Rt	Py	Ap	Zrn	Chl	Spn
LC2-3	1	Cal+Cor+Am+(Po+Rt)	√	√		√		√	√					
LC2-5	1	Cal+Cor+Am+(Po)	√	√		√		√						
LC3-m	1	Cal+Cor+(Spn+Rt)	√	√					√					√
LC1-m	1	Cal+Cor+(Po)	√	√				√						
LC8	2	Cal+Spl+Phl+(Po+Spn)	√		√		√	√						√
LC9-c	2	Cal+Spl+Phl+(Po+Ap)	√		√		√	√			√			
LC4-1	2	Cal+Spl+Phl+(Po+Zrn)	√		√		√	√				√		
LC7-11	2	Cal+Spl+(Po+Chl)	√		√		√	√					√	
LC8-m-	2	Cal+Spl+(Po+Ap+Rt)	√		√			√	√		√			
LC8-bo	2	Cal+Spl+(Po)			√			√						
LC9-2	2	Cal+Spl+(Po)			√			√						
LC1	3	Cal+Phl+(Po+Rt)	√				√	√	√					
LC5-2	3	Cal+Am+(Po+Py)	√			√		√		√				
LC5-11	3	Cal+Am+(Po+Py)	√			√		√		√				

Cal=calcite, Cor=Corundum, Po=Pyrrhotite, Am=Amphibole, Phl=Phlogopite, Spl=spinel, Rt=Rutile, Py=Pyrite, Ap=Apatite, Zrn=Zircon, Chl=Chlorite, Spn=Sphene

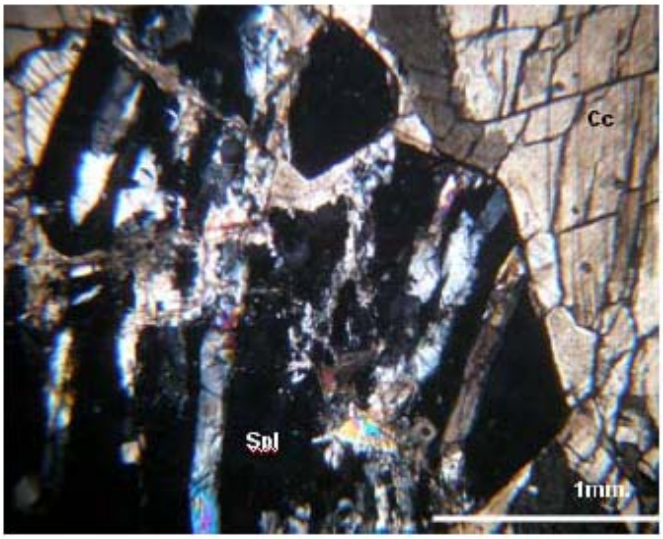

Figure 2: Spinel is granoblastic , . growing by the side of calcite and pseudo isotropic . It can describe that mineral was pressured.

Figure 3: Subhedral Pyrrhotite growth around amphibole. Note that it grows near amphibole and in amphibole.Amphibole and calcite indicate simultaneous growth.

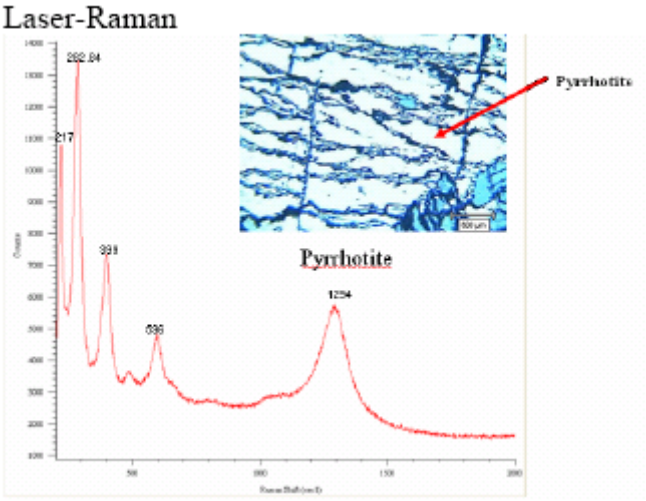

Figure 3: Peak of Laser-Raman show pyrrhotite

Table 2: Result of pyrrhotite from E.P.M.A.

E.P.M.A

No.	31	32	33	34	35	1	2	3
FeO	86.90	86.90	86.93	86.53	86.55	85.95	85.46	86.89
NiO	0.20	0.20	0.22	0.20	0.20	0.14	0.13	0.20
CoO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.00	0.03	0.01	0.01	0.00	0.00	0.00	0.00
tolle'	87.12	87.20	87.15	86.86	86.86	85.78	85.59	87.09
SUM	161.94	161.74	161.36	165.08	165.03	164.49	164.42	164.18
Mw FeO		56+16	72.00					
Mw NiO		58.5+16	74.50					
Mw CoO		59+16	75.00					
Mw MnO		55+16	71.00					
Mole Fe	1.21	1.20	1.21	1.20	1.20	1.19	1.19	1.21
Mole Ni	0.00303	0.00310	0.00294	0.00304	0.00304	0.00195	0.00179	0.00271
Mole Co	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Mole Mn	0.00	0.000395	0.00008	0.00007	0.00	0.00	0.00	0.00
tolle'	1.21	1.20	1.21	1.20	1.20	1.19	1.19	1.21
Mole S	1.20	1.20	1.20	1.21	1.21	1.21	1.21	1.20
Total S	1.1.07395	1.1.07395	1.1.06753	1.1.08915	1.1.08693	1.1.116964	1.1.114827	1.1.076816

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Reference

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