

Zirconolite-bearing symplectites in micro-ijolites: implications for subsolidus processes during ongoing magmatism at Oldoinyo Lengai, Tanzania

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*Cirkonolit-tartalmú szimplektitek mikro-ijolitokban: jelentőségük a szubsolidusz folyamatok
értelmezésében az Oldoinyo Lengai (Tanzánia) területén zajló magmatizmus során*

Appendix / Melléklet

	in iolite matrix		in double corona		in symplectite		
	main element oxide contents in weight percent (wt%)						
	1	2	1	2	1	2	3
SiO ₂	51.6	50.3	53.4	54.4	53.5	50.3	52.2
TiO ₂	1.1	1.5	0.3	0.3	1.1	4.4	1.5
Al ₂ O ₃	1.0	2.1	0.1	0.1	0.2	0.2	1.3
FeO ^T	4.9	5.3	3.9	4.6	6.0	7.7	4.2
MnO	0.1	0.1	0.2	0.1	0.1	0.5	0.1
MgO	15.5	14.7	16.8	16.4	15.2	15.3	16.6
SrO	n.d.	0.1	n.d.	n.d.	0.1	n.d.	n.d.
CaO	25.2	24.7	23.6	23.2	22.5	20.1	23.4
Na ₂ O	0.4	0.5	0.8	1.0	1.3	1.4	0.6
analytical sum	99.8	99.2	99.0	99.9	100.0	99.9	100.0
	numbers of cations based on 6 O in atoms per formula unit (apfu)						
Si	1.91	1.86	1.96	1.98	1.98	1.91	1.86
Ti	0.03	0.04	0.01	0.01	0.03	0.03	0.04
Al ^{IV}	0.05	0.09	0.01	0.00	-	0.05	0.09
Al ^{VI}	-	-	-	-	0.02	-	-
Fe ^{II}	0.03	0.04	0.04	0.05	0.09	0.03	0.04
Fe ^{III}	0.12	0.12	0.08	0.08	0.10	0.12	0.12
Mn	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Mg	0.85	0.81	0.90	0.88	0.84	0.85	0.81
Sr	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	1.00	0.98	0.91	0.90	0.89	1.00	0.98
Na	0.03	0.04	0.05	0.07	0.09	0.03	0.04
sum cations	4.01	3.99	3.96	3.98	4.04	4.01	3.99
mg#	85	83	89	86	82	85	83

ESM Table I. Main element oxide contents of selected clinopyroxenes from distinct textural settings, Oldoinyo Lengai micro-ijolite, Tanzania. mg# – Mg/(Mg + Fe²⁺)*100, molar. The results present measurements obtained by the WDS method. The incorporation of Al into the tetrahedral and octahedral sites followed a charge-balanced fill-up approach.

DM I. táblázat. Néhány reprezentatív, különböző szövettani helyzetből származó klinopiroxénszemcse főelemösszetétele (tömegszázalékban) oxidos formában az Ol-doi-nyo Lengai (Tanzánia) mikro-ijolitjából, WDS-analízis alapján. A moláris mg# Mg/(Mg+Fe²⁺)*100 alapján van számolva. Az Al tetraédéri és oktaédéri pozícióját töltésgyensúly alapján kalkuláltuk.

	Ilm				Prv							
	main element oxide contents in weight percent (wt%)											
	1	2	3	4	1	2	3	4	5	6	7	8
SiO ₂	0.8	1.1	0.9	0.8	1.5	1.4	1.4	1.3	1.6	1.9	2.2	1.3
TiO ₂	50.5	50.4	50.7	50.6	48.8	47.8	49.4	49.6	49.8	48.5	48.9	47.8
Al ₂ O ₃	0.3	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.1
FeO [†]	40.9	40.3	39.9	40.2	1.4	1.5	1.4	1.7	7.5	1.4	2.8	1.3
MnO	1.7	2.0	1.8	1.9	-	-	-	-	-	-	-	-
MgO	5.7	5.9	6.1	6.2	0.3	0.4	0.4	0.3	0.8	0.3	0.5	0.3
SrO	n.d.	n.d.	n.d.	n.d.	1.9	1.8	1.8	1.8	1.7	2.0	2.0	1.7
CaO	0.1	0.2	0.4	0.2	21.9	21.2	21.2	21.6	17.6	21.5	20.6	20.9
Na ₂ O	n.d.	n.d.	n.d.	n.d.	4.2	4.3	4.3	4.2	4.4	4.1	4.2	4.3
La ₂ O ₃	n.a.	n.a.	n.a.	n.a.	4.1	4.8	4.5	4.4	3.2	4.7	4.2	5.6
Nb ₂ O ₅	n.a.	n.a.	n.a.	n.a.	6.3	5.9	5.9	5.1	5.2	5.5	5.5	5.5
Ce ₂ O ₃	n.a.	n.a.	n.a.	n.a.	8.4	7.7	8.6	8.9	7.0	8.6	8.0	8.3
UO ₃	n.a.	n.a.	n.a.	n.a.	0.1	0.1	0.1	0.1	0.3	0.1	0.0	0.2
ThO ₂	n.a.	n.a.	n.a.	n.a.	0.6	0.6	0.7	0.6	0.4	0.8	0.4	0.4
ZrO ₂	n.a.	n.a.	n.a.	n.a.	0.1	0.0		0.0	0.1	0.0	0.2	0.1
HfO ₂	n.a.	n.a.	n.a.	n.a.	0.2	0.2	0.2	0.2	0.2	0.3	0.2	-
Nd ₂ O ₃	n.a.	n.a.	n.a.	n.a.	-	2.0	-	-	-	-	-	2.2
analytical sum	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	numbers of cations based on 3 O in atoms per formula unit (apfu)				numbers of cations based on 5 O in atoms per formula unit (apfu)							
Si	0.02	0.03	0.02	0.02	0.04	0.03	0.03	0.03	0.04	0.05	0.06	0.03
Ti	0.91	0.91	0.91	0.91	0.93	0.91	0.94	0.93	0.94	0.92	0.92	0.92
Al	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00
Fe ^{II}	0.84	0.82	0.82	0.82	0.03	0.03	0.03	0.03	0.16	0.03	0.06	0.03
Mn	0.03	0.04	0.04	0.04	-	-	-	-	-	-	-	-
Mg	0.20	0.21	0.22	0.22	0.01	0.01	0.01	0.01	0.03	0.01	0.02	0.01
Sr	-	-	-	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Ca	0.00	0.00	0.01	0.01	0.59	0.58	0.57	0.58	0.47	0.58	0.55	0.57
Na	-	-	-	-	0.20	0.21	0.21	0.21	0.21	0.20	0.20	0.21
La ₂ O ₃					0.04	0.04	0.04	0.04	0.03	0.04	0.04	0.05
Nb ₂ O ₅					0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06
Ce ₂ O ₃					0.08	0.07	0.08	0.08	0.06	0.08	0.07	0.08
UO ₃					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ThO ₂					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ZrO ₂					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HfO ₂					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nd ₂ O ₃					-	0.02	-	-	-	-	-	0.02
sum cations	2.04	2.04	2.04	2.05	2.03	2.03	2.02	2.01	2.03	2.02	2.02	2.02

ESM Table II. Main element oxide contents of selected ilmenite and perovskite, Oldoinyo Lengai micro-ijolite, Tanzania. The results present measurements obtained by the EDS method (normalized). Based on the instrument and the different types of measurements, the LLD value is generally in the range of about 0.1–0.5 wt% for EDS analyses.

DM II. táblázat. Néhány reprezentatív ilmenit és perovszkítszemcse főelemössze-tétele (tömegszázalékban) oxidos formában az Oldoinyo Lengai (Tanzánia) mik-ro-ijolitjából, EDS-analízis (normált) alapján. A műszer és a különböző mérési mód-sze-rek alapján az EDS-analízisekre jellemző LLD (kimutatási határ) értéke ál-ta-lában körülbelül 0,1–0,5 tömegszázalék.

3D model in supplementary. 3D model for the visualisation of zirconolite twin-ning. The twin relationship was studied in two orientations (α and β) of the crystals (by tilting the sample $\sim 30^\circ$ around [001]), displaying two pairs of orientations. In orientation α , the [1-10] and [010] and in orientation β , the [100] and [130] zone axes are parallel to the electron beam and belong to X and Y twin domains, respectively. The twin axis is parallel to [110] (resulting in 180° rotation around the [110], with the contact plane parallel to (001)). To open the 3D model, use 3D-builder in Windows or the following website: <https://gltf-viewer.donmccurdy.com/>

3D modell. 3D modell a cirkonolit ikresedésének szemléltetésére. Az ikerkapcsolat a kristály két orientációjában (α és β) lett vizsgálva (a minta kb. 30° -kal elfordítást követően a [001] tengely körül), két orientációpárt mutatva. Részletesen a 7. ábra mutatja meg az ikresedési vizsgálatot. A 3D modell megnyitásához használható a Windows-os 3D-builder, vagy az alábbi weboldal: <https://gltf-viewer.donmccurdy.com/>